Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SHOUT
SHARE
IT

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 1000

Contribution from the Office of Farm Management and Farm Economics
G. W. FORSTER, Acting Chief

Washington, D. C. December 30, 1921

LABOR AND MATERIAL REQUIREMENTS OF FIELD CROPS

By

L. A. MOORHOUSE, Associate Farm Economist
O. A. JUVE, Junior Farm Economist

CONTENTS

	Page		Page
Introduction	1	Oats	33
Method of presentation	4	Barley	36
Corn	5	Rye	38
Corn silage	8	Hay	40
Cotton	11	Grass seed crops	45
Potatoes	15	Apples	46
Sugar beets	19	Miscellaneous crops	49
Tobacco	22	Method of using foregoing data	51
Beans	25	Value of plow lands	53
Grain sorghums	28	Labor distribution among farm enterprises	54
Wheat, spring and winter	29		

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 1000

Contribution from the Office of Farm Management and Farm Economics.

G. W. FORSTER, Acting Chief.

Washington, D. C. December 30, 1921

LABOR AND MATERIAL REQUIREMENTS OF FIELD CROPS.

By L. A. MOORHOUSE, *Associate Farm Economist*, and O. A. JUVE, *Junior Farm Economist.*

CONTENTS.

	Page.		Page.
Introduction	1	Oats	33
Method of presentation	4	Barley	36
Corn	5	Rye	38
Corn silage	8	Hay	40
Cotton	11	Grass seed crops	45
Potatoes	15	Apples	46
Sugar beets	19	Miscellaneous crops	49
Tobacco	22	Method of using foregoing data	51
Beans	25	Value of plow lands	53
Grain sorghums	28	Labor distribution among farm enterprises	54
Wheat, spring and winter	29		

INTRODUCTION.

There is a growing demand for information relating to the quantities of labor and materials required for agricultural production, especially with reference to the staple farm crops and the leading classes of live stock. In the cost of production studies which have been conducted by the Office of Farm Management and Farm Economics, United States Department of Agriculture, particular emphasis has been laid on the quantity requirements of labor and materials—hours of man labor, hours of horse labor, hours of tractor labor, pounds or bushels of seed, loads of manure, pounds of fertilizer, and quantities of other materials that are utilized in producing crops or live stock. When these items are known, it is easy to compute costs at any given time by applying the prevailing rate for each item.

This method makes it possible to determine approximate costs for any period, irrespective of changes in material and labor rates. As a rule, field practice does not change greatly from year to year, and the hours of man labor and the quantities of material necessary in the production of a given crop or a given class of live stock provide a

60765°—21—Bull. 1000——1

more permanent basis for comparative determinations than mere money costs. For this reason the quantity requirements have come to be regarded as fundamental in any discussion of farm management problems.

In this bulletin all of the available crop requirement data assembled by the United States Department of Agriculture are summarized. In bringing these data together the Office of Farm Management and Farm Economics has based its findings upon two sources of information: First, enterprise survey records covering the more important farm crops which have been obtained during the past ten years; second, a large number of detailed farm accounting records which have been assembled in cooperation with several agricultural experiment stations. Labor and material requirements per acre are reported in this bulletin for the following crops:

Corn, corn silage, cotton, wheat, oats, barley, rye, grain sorghums, field beans, potatoes, sugar beets, tobacco, apples, and hay, and a few miscellaneous field crops.

In each instance the results have been compiled and averaged by districts. In obtaining the original records from which the accompanying tables have been prepared, representative areas or regions were selected for the studies. Thus the figures which are given for each of these regions are directly applicable to many other districts where agricultural conditions are similar.

The data given in the tables may be used in two ways. In the first place, by applying current prices for labor, seed, fertilizer, and other materials to the quantity requirements, the cost of producing a crop may be approximately calculated. The farmer who is conducting his work in a businesslike way will frequently desire to make estimates of this character. If a crop which he has used extensively in the past does not promise well, on account of an unfavorable market outlook, a few calculations will enable him to estimate probable results with the new combinations which appear to be practicable.

In the second place, quantity requirements may be applied in readjusting the enterprises of the farm as a whole. With this information available, the operator can obtain a clear idea of his labor requirements at different seasons, and peak loads may be avoided by developing the farm plan in such a manner as to distribute the man labor and horse labor uniformly. From a farm organization standpoint, therefore, these basic factors have proved to be exceedingly valuable.

Each type of farming develops practices which influence the quantity of man and horse labor that may be required in growing and marketing a given product. While field practice in any given district has a tendency to be quite uniform, and while the average

requirements which have been determined for these individual areas can be applied safely in estimating costs and in working out readjustments in the organization of the farm when ordinary practices are followed, further study is needed to show requirements for special practices. For example, in typical wheat regions wheat may be grown by what is known as the summer fallow method, or it may be stubbled in after wheat, or it may be grown after some other crop, the land having been plowed and a suitable seed bed prepared. The requirements are not the same for all these cases. To provide the wheat farmer with specific directions, it would be necessary to get data on the labor and material requirements in growing and marketing the crop under the special conditions, or, better still, to gather detailed enterprise records in typical areas where these conditions prevail.

Cost-accounting records available for several of the crops included in this discussion make it possible to show the distribution of man labor and horse labor throughout the year. Such information is a distinct aid in combining crop enterprises so as to utilize the available farm labor economically. These facts often provide the key for increased efficiency in the management of labor, and a corresponding increase in the profits is the result. A knowledge of the quantity of labor and time required is necessary in adjusting crop production to market demands and in revising cropping systems. If labor is relatively high-priced, and a given crop requires a large quantity of labor in its production, the operator may be in a position to decide that this enterprise should be curtailed somewhat, in view of the price situation. On the other hand, the cost of labor and the market outlook may warrant the expansion of an enterprise, and the basic requirements should indicate the more important changes which will have to be made in the program of work.

Many farmers are keeping complete accounts of the farm business. After reviewing the returns for several years it may appear desirable to expand certain enterprises in order to increase farm profits. How will this expansion affect the organization of the farm? The answer to this question may be found, in part by analyzing the individual farm record, and in part by consulting the labor distribution charts for different crops in various parts of the country published herewith. Such a review will enable the farm operator to determine with a reasonable degree of accuracy whether he can meet the proposed adjustments with the supply of labor available. He will also be in a position to approximate his seed and other material requirements, and if the contemplated change is decided upon, can make due arrangements for procuring the necessary supplies in season.

Two terms used in this bulletin require a brief explanation, namely, "operating expense" and "total cost." Operating expense, as

used in this discussion, includes all items of expense except the charge for the use of land; namely, the cost of man and horse labor, the cost of materials (such as seed, manure, fertilizer, containers, and chemicals used in the treatment of seed or for controlling insect pests), machinery and equipment costs, taxes, insurance, thrashing charges, and overhead. Total cost takes into account the items which have been enumerated and includes, in addition, interest, or rent charge for the use of land.

As an aid to estimating total expense of production, it is important to know what part the cost of labor and materials is of the total operating expense. In each of the following tables this percentage has been indicated. In a few cases it was not possible to determine the percentage for each district, but in these instances the relationship for the region has been worked out and these percentages can be applied in estimating the total operating expense. For several crops the labor and material requirements constitute rather uniformly from 65 to 85 per cent of the total operating expense.

In studying the various tables which follow it may be desirable to know how each item of cost compares with other items of cost, with the total operating expense, or with the total cost. A table therefore has been prepared for each crop, showing the percentage distribution of the total operating expense, and also of the total cost, among the various items of cost. In the production of a crop like wheat or barley the percentage distribution of the total operating expense may not vary greatly in two distinct regions, one of which has high land values, the other low land values. When total cost is considered, however, there will be a wide variation, because in the district having high priced land the interest charge will constitute a comparatively large part of the total cost.

In connection with each table certain significant differences in the quantity requirements shown for the respective districts are pointed out. If field practice influences requirements appreciably, especially if such practice happens to be somewhat unusual, the practice in question is discussed briefly, so that the reader may be able to interpret results accurately. It is not possible, however, to discuss in a bulletin of this character all the methods involved in the production of each individual crop.[1]

METHOD OF PRESENTATION.

The acre requirements for different crops are given in tabular form. The distribution of labor for each enterprise is also shown graphically in figures 1 to 14. The purpose of these graphs is to

[1] Several bulletins relating to the cost of producing special crops have been issued by the Office of Farm Management and Farm Economics. These publications describe the more important methods of production in some detail. (See reference lists which accompany tables.)

visualize the demand for labor in the production of the more important staple crops. Records for typical regions have been selected in each instance. The labor distribution is given by 10-day periods, except in the graph for sugar beets, which was prepared from enterprise cost records. In the latter case the distribution is shown by months.

In order to permit direct comparisons the graphs have all been drawn to the same scale, with the exception of those for tobacco, sugar beets, and apples. In these three cases it was found desirable to make the scales from two to two and one-half times the standard employed for other crops.

The length of the bars in each graph represents the total hours spent per acre during 10-day periods, and since with the exceptions noted the same scale is used throughout, the black bars not only show the distribution of labor for the various crops, but in comparison show also variations in the amount of labor required by different crops.

By referring to figure 12, which gives the labor distribution for hay, it will be observed that the major portion of the work on this particular crop occurs during the first 20 days in July. Apart from harvest labor, hay makes very little demand for labor. With spring wheat, on the other hand, the demand for labor is concentrated at two distinct points. One of these occurs during the seeding period in April and May. The other comes at the harvest season in August and September. The cotton graph shows that man labor on the cotton crop is distributed throughout a period of 11 months.

In using graphs of this type it is desirable to compare seasonable labor demands on a percentage basis. To permit comparisons of this character, monthly percentage figures are presented both for man labor and for horse labor.

CORN.

The figures which are shown in Table 1 are based upon 253 enterprise records representing the requirements (exclusive of marketing) of 14,510 acres of corn distributed as follows: Kansas and Nebraska, 2,385; Iowa, 3,748; Illinois, 4,336; Indiana and Ohio, 1,489; Virginia, Maryland, Pennsylvania, and Delaware, 2,552.[1]

The hours of labor required to produce an acre of corn naturally depend upon cultural practices and methods of harvesting. In the central part of the Corn Belt the usual method of harvesting is to husk the corn from the standing stalk and then pasture the fields. The average requirements for these areas were found to be about 19 man hours and 46 horse hours per acre. In eastern districts, where

[1] These data were obtained from an unpublished report which was prepared by M. R. Cooper and H. G. Strait, of the Office of Farm Management and Farm Economics.

the corn is cut and husked from the shock, the average labor requirements were about 53 man hours and 56 horse hours per acre.

In Kansas and Nebraska a large acreage of corn was listed. However, in the Kansas area the total hours per acre where the ground was plowed and planted in the regular way were practically the same as the total hours reported when listing was practiced. In Nebraska the man hours were slightly less with listing and the horse labor about 9 hours less than in cases where the land was plowed.

The usual practice in the two Iowa districts included stalk cutting, plowing with a two-bottom gang, disk (once), spike-harrow (twice), occasionally roll, plant with a two-row check planter, harrow twice while corn is small, and cultivate three times. Essentially the same treatment was given on the Illinois farms. Indiana operators plowed the land with walking and sulky plows, then disked, harrowed from one to three times, rolled occasionally, and planted with a two-row check planter. The spike-tooth harrow and roller were also used for the first cultivation and corn was cultivated about four times with a one-row implement. Practically the same treatment was given in Ohio.

TABLE 1.—*Corn: Labor and material requirements per acre, exclusive of marketing (253 records).*[a]

Region.	Number of records.	Average yield per acre.	Man labor.			Horse labor.			Seed.	Manure.	Fertilizer.	Twine.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest from standing stalk.	Total.				
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Loads.*	*Lbs.*	*Lbs.*
CORN-BELT AREAS (CORN HARVESTED FROM STANDING STALK).												
Kansas	25	25	15.6	6.1	21.7	34.5	12.3	46.8	7.7	0.6	.....	.....
Nebraska	11	40	9.5	5.0	14.5	28.3	10.1	38.4	8.0	.7	.....	.....
Southwestern Iowa	18	48	10.0	6.3	16.3	30.2	12.7	42.9	8.3	.7	.....	.....
East central Iowa	55	48	12.0	6.4	18.4	32.0	12.8	44.8	8.0	1.4	.....	.....
Western Illinois	30	46	13.1	6.6	19.7	33.2	12.9	46.1	8.1	1.0	.....	.....
Eastern Illinois	16	42	11.0	5.7	16.7	33.5	11.5	45.0	7.7	.6	.....	.....
Indiana	14	49	17.3	8.3	25.6	42.8	16.5	59.3	7.9	1.0	22	.....
EASTERN AREAS (CORN CUT AND HARVESTED FROM SHOCK).												
Ohio	13	45	20.4	28.5	48.9	38.5	14.5	53.0	8.2	2.2	27	2.0
Virginia	12	52	22.1	27.9	50.0	41.9	17.7	59.6	10.4	2.0	35	1.6
Maryland	12	60	23.5	36.0	59.5	45.2	18.5	63.7	8.7	3.8	.....	2.2
Pennsylvania	22	62	19.1	31.2	50.3	40.6	13.4	54.0	7.6	4.0	54	2.8
Delaware	25	47	19.4	35.1	54.5	40.0	12.0	52.0	11.9	5.1	76	2.9

[a] The labor and material requirements as reported constitute 85 per cent of the operating expense in the corn belt and 88 per cent in eastern districts.

For the eastern districts field practice differed appreciably from practice in the central part of the corn belt. Three-horse walking plows were used quite generally. The disk was not employed to

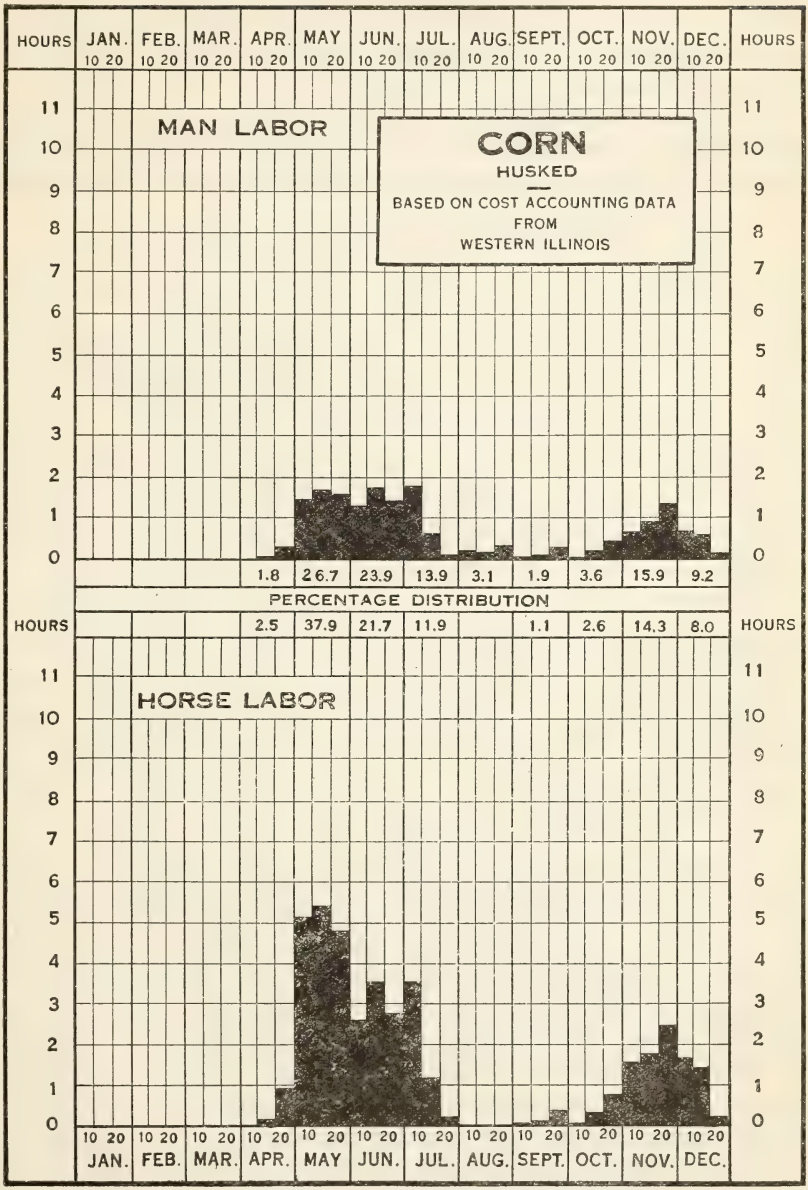
HOURS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
CORN
HUSKED
BASED ON COST ACCOUNTING DATA FROM WESTERN ILLINOIS
1.8 26.7 23.9 13.9 3.1 1.9 3.6 15.9 9.2
PERCENTAGE DISTRIBUTION
2.5 37.9 21.7 11.9 1.1 2.6 14.3 8.0
HORSE LABOR

FIG. 1.—Distribution of man labor and horse labor for 9 farms producing a total of 426 acres of corn. Most of the corn on these farms was husked from standing stalks. Black bars indicate total hours spent per acre during 10-day periods.

any great extent in Virginia and Maryland, but was used in Pennsylvania and Delaware. Spring-tooth harrowing was quite common. The ground was rolled or dragged once in Virginia and Maryland and twice in Pennsylvania and Delaware. Very little harrowing was done after planting. From three to five cultivations were given in the eastern districts.

The average fertilizer application for the five eastern districts was 193 pounds per acre where used. Excepting in the Indiana district, no commercial fertilizer was applied by the farmers in western districts.

TABLE 2.—*Corn: Percentage distribution of costs.*

Item.	Corn-belt areas.		Eastern areas.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	31.1	20.5	40.7	33.0
Horse labor	44.8	29.5	25.9	21.0
Materials:				
Seed	2.3	1.5	1.0	.8
Twine			1.4	1.2
Manure	7.2	4.8	17.2	14.0
Fertilizer			1.5	1.2
Total materials	9.5	6.3	21.1	17.2
Other costs:				
Overhead	7.7	5.0	7.9	6.4
Machinery	6.9	4.5	4.4	3.6
Total other costs	14.6	9.5	12.3	10.0
Land charge[a]		34.2		18.8
Value of land per acre	$184		$163	

[a] Includes taxes and insurance.

CORN SILAGE.

In Table 3 (corn silage) the labor is divided into two groups, the first of which includes all the labor from manure hauling up to the last cultivation, the second the operations from the time cutting begins to packing the corn into the silo. For the regions studied the operations performed in growing and harvesting silage are very much the same. The variations in labor requirements are therefore due chiefly to differences in methods of doing the same kind of work. The use of large power units for seed-bed preparation and cultivation is an important factor in reducing the man-labor cost. For example, on the Iowa farms, which report the lowest man-labor requirement per acre, prior to harvest, the man and horse hour ratio is 1 to $2\frac{1}{2}$, while in Ohio, which reports the highest labor requirement prior to harvest, it is 1 to 1.6. Other factors that may contribute to making these variations in man-labor requirements are difference in quantity

of manure hauled per acre, greater adaptability of land to corn production, and better management and skill in growing corn.

The harvesting labor is not influenced so much by the size of the machinery used as by variations in yield and the distance that the corn is hauled from the field to the silo. The influence of distance does not appear in the average figures because the average distance is likely to be very much the same for the various States, but the influence of yield on harvest labor is clearly shown by the difference between the New York and the Minnesota figures.

TABLE 3.—*Corn silage: Labor and material requirements per acre (271 records).*

Region.	Number of records.	Average yield.	Man labor.			Horse labor.			Seed.	Manure.	Fertilizer.	Fuel.		Twine.	Per cent of operating expense [a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.				Gas.	Coal.		
		Tons.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Loads.*	*Lbs.*	*Gals.*	*Lbs.*	*Lbs.*	
Minnesota	30	7.1	13.4	10.2	23.6	36.6	15.7	52.3	14.0	3.6	.....	.....	22.0	3.3	76
Wisconsin	97	9.4	14.5	15.6	30.1	34.1	19.5	53.6	11.4	4.7	.....	2.5	20.5	3.6	84
Iowa	55	9.8	12.9	15.0	27.9	31.9	20.0	51.9	9.9	2.2	.....	2.8	14.0	3.6	80
New York	83	13.0	26.5	25.6	52.1	45.3	19.6	64.9	24.2	6.1	219.0	2.1	16.0	4.1	84
Ohio	6	8.3	27.2	24.1	51.3	38.7	22.5	61.2	7.8	6.2	.....	.....	.....	2.2	79

[a] Excluding interest on land.

The cost for seed is very small compared with the seed cost for many other farm crops. The range from 10 pounds per acre in Iowa to 24 pounds in New York is therefore not of much importance from the cost standpoint but is of interest in that it indicates different practices in the two States.

Much of the silage corn is cut and bound with the binder. Some of it is cut loose, but the percentage of the corn handled in this way is extremely small. The quantities of twine given in these records can therefore be considered as fair figures to use when determining the cost of corn harvested with the binder.

Corn responds very well to manuring and therefore receives most of the manure produced on the farms where it is grown. On the Wisconsin farms the records show that although corn does not occupy more than about one-fourth of the crop area it receives over half of the available manure.

Gasoline, coal, and wood were all used for fuel in filling silos, but the number of farmers using wood was so small that it disappears in an average. Because of the fact that the Ohio records give only the value of the fuel used and not the quantity it was impossible to determine the quantity of fuel for that State, but by comparing values it would seem that the fuel consumed would approximate that consumed in New York.

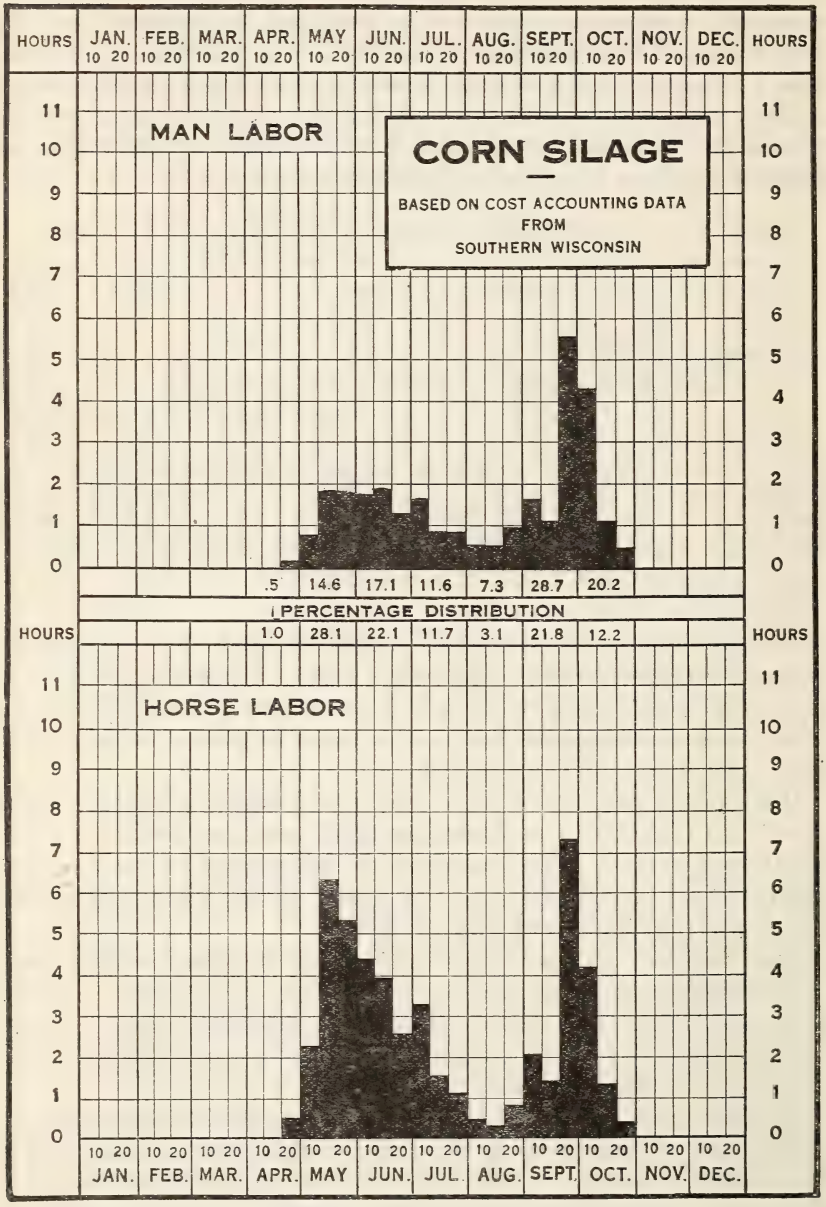

FIG. 2.—Distribution of man labor and horse labor for 13 farms having a total production of 325 acres of corn silage. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 4.—*Silage: Percentage distribution of costs per acre.*

Item.	Iowa.		New York.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	24.8	16.8	24.6	21.0
Horse labor	29.8	19.3	21.5	18.3
Materials:				
Seed	2.2	1.5	2.3	2.0
Twine	1.8	1.2	1.1	1.0
Fuel	2.5	1.8	1.0	.8
Manure	16.5	11.4	32.0	28.0
Total materials	23.0	15.9	36.4	31.8
Other costs:				
Overhead	6.9	4.9	6.6	5.7
Machinery	15.5	10.5	10.9	9.2
Total other costs	22.4	15.4	17.5	14.9
Land charge	.....	32.6	.....	14.0
Value of land per acre	$190		$120	

COTTON.

During the year 1918 enterprise cost records were obtained in 10 southern counties. The acreage devoted to cotton on the farms visited in these counties was as follows: Anderson (S. C.), 2,866; Barnwell (S. C.), 3,936; Laurens (Ga.), 3,968; Greene (Ga.), 4,148; Sumter (Ga.), 4,188; Tallapoosa (Ala.), 1,169; Marshall (Ala.), 1,250; Dale (Ala.), 1,226; Ellis (Tex.), 8,148; Rusk (Tex.), 2,568—total for all districts, 33,467 acres.[1] The labor and material requirements as shown by this survey are summarized in Table 5.

TABLE 5.—*Cotton: Labor and material requirements per acre (842 records, 1918 crops).*

Region.	Number records.	Yield of lint per acre.	Man labor.			Mule labor.			Seed.	Fertilizer.	Per cent of operating expense[a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.			
South Carolina:		*Lbs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Lbs.*	
Anderson Co.	89	248	75	56	131	45	12	57	35	404	86
Barnwell Co.	91	268	73	63	136	45	17	62	31	555	86
Georgia:											
Laurens Co.	85	277	61	64	125	44	16	60	25	288	85
Greene Co.	78	260	74	57	131	47	13	60	35	257	85
Sumter Co.	80	244	81	55	136	53	11	64	38	286	84
Alabama:											
Tallapoosa Co.	89	172	85	39	124	50	9	59	35	187	87
Marshall Co.	90	227	76	51	127	51	8	59	30	333	85
Dale	90	194	67	50	117	46	7	53	28	250	85
Texas:											
Ellis Co.	75	176	31	25	56	33	4	37	22	.....	79
Rusk Co.	75	185	49	37	86	42	8	50	25	145	83

[a] Excluding interest on land.

[1] An analysis of labor practices for the farms represented in these counties is given in U. S. Dept. of Agriculture Bulletin 896, entitled "The Cost of Producing Cotton."

The more extensive cultural methods followed in Texas, as compared with those followed in the southeastern portions of the Cotton Belt, explain in some measure the differences in man-labor requirements. The lower yields reported for the three Alabama areas in 1918 will account for the low labor requirement of those areas as compared with that of the five districts in Georgia and South Carolina. There was marked uniformity in the average requirements for man labor in the latter districts.

Farm manure is not used extensively in cotton production, largely because live-stock farming does not figure as an important part of the farm business. Only 27 per cent of the operators who were interviewed applied manure to a part of the cotton land. Commercial fertilizer was applied in all districts except Ellis County, Tex. In Rusk County, Tex., the average application was 145 pounds per acre, while in Barnwell County, S. C., the average application was 555 pounds per acre.

The seed cotton picked per day varied under average conditions from 142 pounds per day in Barnwell County, S. C., to 236 pounds per day in Ellis County, Tex. The average amount picked per day in several of these districts was not far from 150 pounds of seed cotton. It is undoubtedly true that the rate of picking exceeds these average amounts during the early part of the season, more especially for the first and second times over, but late in the season the average rate would be greatly reduced on account of the smaller number of bolls opening at that time.

Since picking constitutes an important part of the man labor in producing cotton, any noticeable reduction in yield would influence the total man labor requirement. In the Georgia districts it required 45 to 57 man hours per acre (district averages) for this harvest work; in South Carolina the range was from 47 to 49 hours per acre, while in Texas the picking amounted to 24 and 32 hours, respectively, for the two districts.

In 1919 farm survey and cost records were obtained in 12 southern counties, and the acreage of cotton represented in each of these areas was as follows: Anderson (S. C.), 2,018; Barnwell (S. C.), 2,301; Laurens (Ga.), 3,111; Greene (Ga.), 3,000; Mitchell (Ga.), 2,310; Lauderdale (Ala.), 1,470; Marshall (Ala.), 1,196; Ellis (Tex.), 7,408; Rusk (Tex.), 2,233; Washington (Miss.), 2,524; Monroe (Miss.), 1,644; Lee (Ark.), 3,347; making a total of 32,562 acres.

TABLE 6.—*Cotton: Labor and material requirements per acre (821 records, 1919 crop).*

Region.	Number of records.	Yield.		Man labor.			Mule labor.			Seed.	Fertilizer.	Ginning charge.
		Lint.	Seed.	Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.			
South Carolina:		*Lbs.*	*Lbs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Lbs.*	*P. cwt.*
Anderson Co.[a]	74	286	495	80	60	140	45	14	59	35	449	$1.00
Barnwell Co.	76	248	408	65	52	117	41	12	53	28	699	1.04
Georgia:												
Laurens Co.	77	93	168	55	23	78	39	3	42	26	254	1.24
Greene Co.	74	225	413	63	45	108	40	8	48	37	295	1.11
Mitchell Co.	50	159	300	61	39	100	43	5	48	30	277	1.07
Alabama:												
Marshall Co.	79	272	473	70	58	128	46	11	57	31	369	1.02
Lauderdale Co.	84	192	345	69	51	120	47	7	54	29	168	1.10
Mississippi:												
Washington Co.	29	171	391	87	54	141	47	5	52	35	.....	1.69
Monroe Co.	49	132	238	54	34	88	35	6	41	34	(b)	1.39
Arkansas:												
Lee Co.	83	174	363	109	55	164	47	8	55	34	(b)	1.35
Texas:												
Ellis	71	c 50 d 29 e 24	134	31	15	46	29	2	31	22	.....	1.80
Rusk	75	61	106	48	16	64	37	3	40	22	105	1.87

[a] On 34 owned farms producing wage cotton, man labor, mule labor, seed, fertilizer, and manure constituted 85 per cent of the total operating expense. By adding ginning to the foregoing list the operating expense amounted to 89 per cent of total cost, excluding interest on land.
[b] In Monroe County, Miss., fertilizer was applied on only 13 farms; in Lee County, Ark., on only one.
[c] Picked cotton.
[d] Bollie cotton.
[e] Unginned seed cotton.

The total man labor requirements were exceptionally low in Ellis and Rusk Counties, Tex., and relatively low in Laurens County, Ga. (See Table 6.) It will be observed that comparatively small yields were reported for the farms surveyed in these counties, and this is reflected in the quantity of labor utilized in harvesting the crop. This factor also influenced the mule hours to a certain extent.

Exceptionally high man labor requirements are given for Lee County, Ark., and Washington County, Miss. In both of these areas there was a considerable growth of grass and weeds during the early part of the summer and this necessitated much extra hoeing. This condition was somewhat unusual.

The lowest average application of commercial fertilizer was reported for Monroe County, Miss.; the highest, in Barnwell County, S. C. Commercial fertilizers were used very generally in the latter State, while in Monroe County, Miss., fertilizer was used on very few of the farms. In Lee County, Ark., only one farm reported use of fertilizer, while farmers in Washington County, Miss., and Ellis County, Tex., did not use any.[1]

[1] Reference on cotton:
Dept. Bulletin 492. An Economic Study of Farming in Sumter Co., Ga.
Dept. Bulletin 511. Farm Practice in the Cultivation of Cotton.
Dept. Bulletin 648. A Farm Management Survey in Brooks Co., Ga.
Dept. Bulletin 651. A Farm Management Study in Anderson Co., S. C.
Dept. Bulletin 659. A Farm Management Study of Cotton Farms in Ellis Co., Tex.

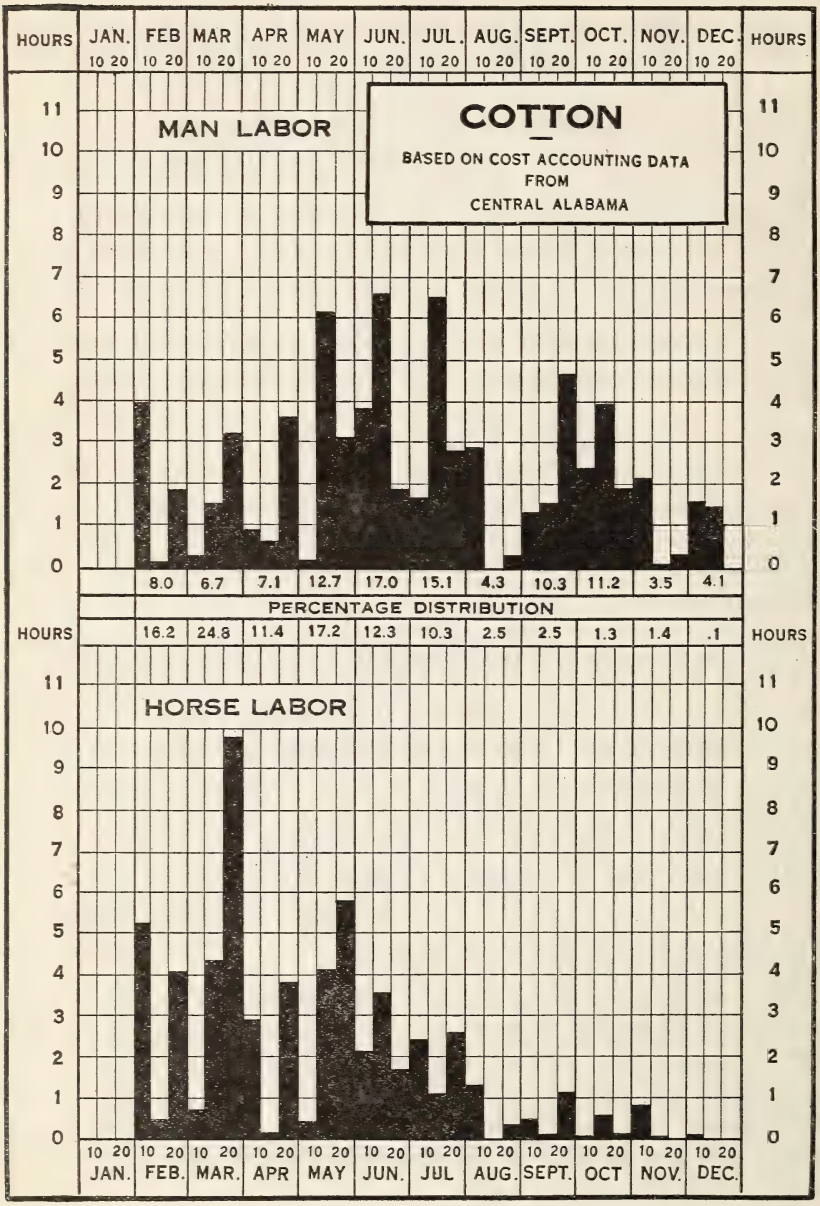

FIG. 3.—Distribution of man labor and horse labor for one farm during a series of years, representing the production of 25 acres of cotton annually. Large type machinery used. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 7.—*Cotton: Percentage distribution of costs per acre (1918 crop).*

Item.	Anderson Co., S. C.		Ellis Co., Tex.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	63.8	54.3	60.0	38.1
Mule labor	10.0	8.5	15.1	9.6
Materials:				
Seed	2.5	2.1	3.9	2.5
Manure	.6	.6	(a)	(a)
Fertilizer	8.7	7.4		
Sacks and sheets	.2	.2	.2	.1
Total materials	12.0	10.3	4.1	2.6
Other costs:				
Ginning	2.9	2.5	6.2	4.0
Machinery	2.3	2.0	5.1	3.2
Overhead	9.0	7.6	9.5	5.9
Total other costs	14.2	12.1	20.8	13.1
Land charge		14.8		36.6
Value of land per acre	$110		$190	

a Less than one-tenth of 1 per cent.

POTATOES.

In this study 26 potato-growing districts were visited and 918 farmers were interviewed (Table 8). The acreage of potatoes represented was as follows: Early potatoes (southern districts), 11,487; midsummer potatoes (central coastal plain), 5,598; late crop potatoes in Maine, New York, Michigan, and Wisconsin, 6,373; in Iowa and Minnesota, 4,763; in Colorado, 2,210; in Washington, 782—total, 31,213 acres.[1]

There was a wide range in normal man-labor and horse-labor requirements. It would be natural to look for some uniformity in the man-labor and horse-labor requirements within a given region, more particularly if the conditions under which the crop was grown happened to be fairly uniform and the yields were approximately the same. In the region producing the midsummer crop of potatoes the amount of man labor utilized in marketing was much the same for all districts. However, the central New Jersey district, reporting the highest yield per acre, had the minimum labor requirement.

Farm manure applications varied from 7 to 12 loads per acre in the late potato districts and three of the midsummer districts. Commercial fertilizers were used in larger quantities in the early and midsummer districts than in the late producing areas. The Maine districts may be taken as exceptions from this general statement. Comparatively light applications were made in the three

[1] The enterprise records which were used in compiling the information on potatoes were obtained during the years 1912–1913 by H. H. Clark and L. L. Corbett. A report prepared by E. H. Thomson in connection with this cost survey was available for reference in compiling Table VIII.

New York districts. The rest of the late-producing areas applied no fertilizer whatever.

In the majority of these districts man labor and horse labor, manure, seed, and fertilizer constituted 72 per cent or more of the total cost of producing potatoes exclusive of land rent. These results have been computed on the basis of normal yield.

TABLE 8.—*Potatoes: Labor and material requirements per acre (918 records), 1912–13.*

Region.	Number of records.	Normal yield per acre.	Man labor.			Horse labor.			Seed.	Manure.	Fertilizer.	Per cent of operating expense [a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.				
Early:		*Bush.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Loads.*	*Lbs.*	*Per ct.*
Florida	42	122	44	60	104	62	18	80	13.2	.....	1,920	77
Texas	43	87	23	24	47	41	12	53	11.4	.....	.....	80
South Carolina	35	146	68	48	116	54	12	66	14.3	.....	1,980	80
Midsummer:												
Virginia—Norfolk	37	142	54	35	89	47	14	61	11.7	.....	1,840	78
Eastern shore	22	139	50	32	82	60	11	71	10.0	.....	1,300	72
New Jersey—Southern	31	173	38	32	70	43	25	68	10.8	4.7	1,680	89
Central	36	245	36	31	67	54	27	81	13.1	3.4	1,500	89
Long Island	82	167	43	32	75	48	20	68	12.0	2.1	1,840	89
Late:												
Maine—Aroostook County	81	254	44	51	95	70	34	104	13.8	2.2	1,840	87
Southern	23	259	48	57	105	71	44	115	14.2	4.7	1,800	90
New York—Northern	19	211	56	63	119	69	39	108	12.6	5.5	260	92
Western	68	151	41	42	83	59	33	92	11.8	5.3	120	87
Southern	56	135	42	50	92	50	31	81	9.4	4.2	160	90
Michigan—Southeastern	20	138	40	42	82	48	25	73	7.4	4.7	.....	91
Traverse Bay	20	148	46	56	102	40	27	67	9.9	3.6	.....	89
Southwestern	20	145	32	46	78	38	28	66	8.0	4.2	.....	89
Wisconsin—Central	47	127	26	34	60	31	30	61	7.0	2.6	.....	85
Southern	15	185	37	45	82	44	41	85	15.1	3.3	.....	87
Iowa—Eastern	22	174	36	33	69	52	33	85	14.7	4.5	.....	88
Grundy County	19	151	25	28	53	49	28	77	16.6	1.8	.....	87
Minnesota—Eastern	46	116	32	34	66	38	33	71	7.4	3.1	.....	87
Clay County	25	122	18	40	58	41	28	69	12.2	1.8	.....	77
Colorado—Greeley	44	217	31	42	73	67	28	95	11.3	2.2	.....	72
Montrose County	19	258	46	47	93	71	36	107	16.2	4.5	.....	73
Washington—Eastern	25	145	23	31	54	36	24	60	7.3	1.3	.....	74
Yakima	21	311	44	84	128	49	40	89	14.4	3.4	.....	73

[a] Excluding interest on land.

An enterprise survey was made in nine Northern potato-growing districts during the year 1920. Four hundred and sixty-one growers were interviewed and records were obtained for the following potato acreages: Minnesota, 3,428; Wisconsin, 995; Michigan, 1,005; New York, 1,100; and Maine, 1,633—total, 8,161 acres.[1]

[1] The requirements which are given in Table 9 were prepared by W. C. Funk, of the Office of Farm Management and Farm Economics, U. S. Department of Agriculture.

TABLE 9.—*Potatoes: Labor and material requirements per acre (461 records, 1919).*

Region.	Number of records.	Yield per acre	Man labor.			Horse labor.			Seed.	Manure.	Fertilizer.	Percent of operating expense[a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.				
Minnesota:		*Bush.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Tons.*	*Lbs.*	
Clay County	51	103	18.3	[b] 10.9	[b] 29.2	46.1	19.6	65.7	12.3	2.3	.....	74.5
Anoka County	54	104	34.9	28.8	63.7	60.3	26.6	86.9	9.5	6.0	.....	77.2
Wisconsin:												
Barron County	47	152	47.6	45.1	92.7	61.5	38.8	100.3	11.6	7.1	(c)	80.6
Waupaca County	50	123	41.7	35.7	77.4	46.3	30.9	77.2	10.6	5.5	.....	82.3
Michigan:												
Montcalm County	49	109	40.1	33.8	73.9	54.8	30.7	85.5	7.7	6.0	(c)	80.7
Grand Traverse County	52	124	49.9	40.3	90.2	54.4	23.6	78.0	11.3	5.0	.....	80.4
New York:												
Steuben County	50	141	40.8	46.3	87.1	58.4	40.0	98.4	11.2	4.5	(c)	81.2
Monroe County	50	110	47.9	37.7	85.6	76.5	39.5	116.0	13.2	7.1	(c)	81.2
Maine:												
Aroostook County	58	254	50.4	[b] 27.2	[b] 77.6	71.1	38.9	110.0	14.0	2.0	1,965	83.5

[a] Excluding interest on land.
[b] Picking not included in time for harvesting and total hours.
[c] Commercial fertilizers not generally used.

Since picking was not included in the time for harvesting in all areas, the harvest labor as well as the total man labor appears comparatively low for Clay County, Minn., and Aroostook County, Me. In both of these districts the potatoes were picked largely by contract.

Considerable variation was found in the labor requirements for the same operation in different areas. For example, in Clay County, Minn., two-row cultivators are not uncommon and man-labor-saving machinery can be used to good advantage, while in some of the districts potatoes are planted and dug by hand.

Commercial fertilizer was not used extensively outside of the Maine area. The lowest application noted in this area was 1,333 pounds per acre and the highest was 2,800. The use of manure was common to all areas. With the exception of two districts, namely, Clay County, Minn., and Aroostook County, Me., over 75 per cent of the potato acreage was manured.

There was quite a wide range in the quantity of seed potatoes used in these districts. The five farms using the least seed in Montcalm County, Mich., used an average of 5.7 bushels of seed per acre, while in Barron County, Wis., the five farms using the most seed averaged 16.2 bushels per acre. When seed is high in price, this item is exceedingly important from a cost standpoint.

The per cent of total operating expense represented by the factors which are included in Table 9 varied on the average from 74.5 in Anoka County, Minn., to 83.5 in Aroostook County, Me.

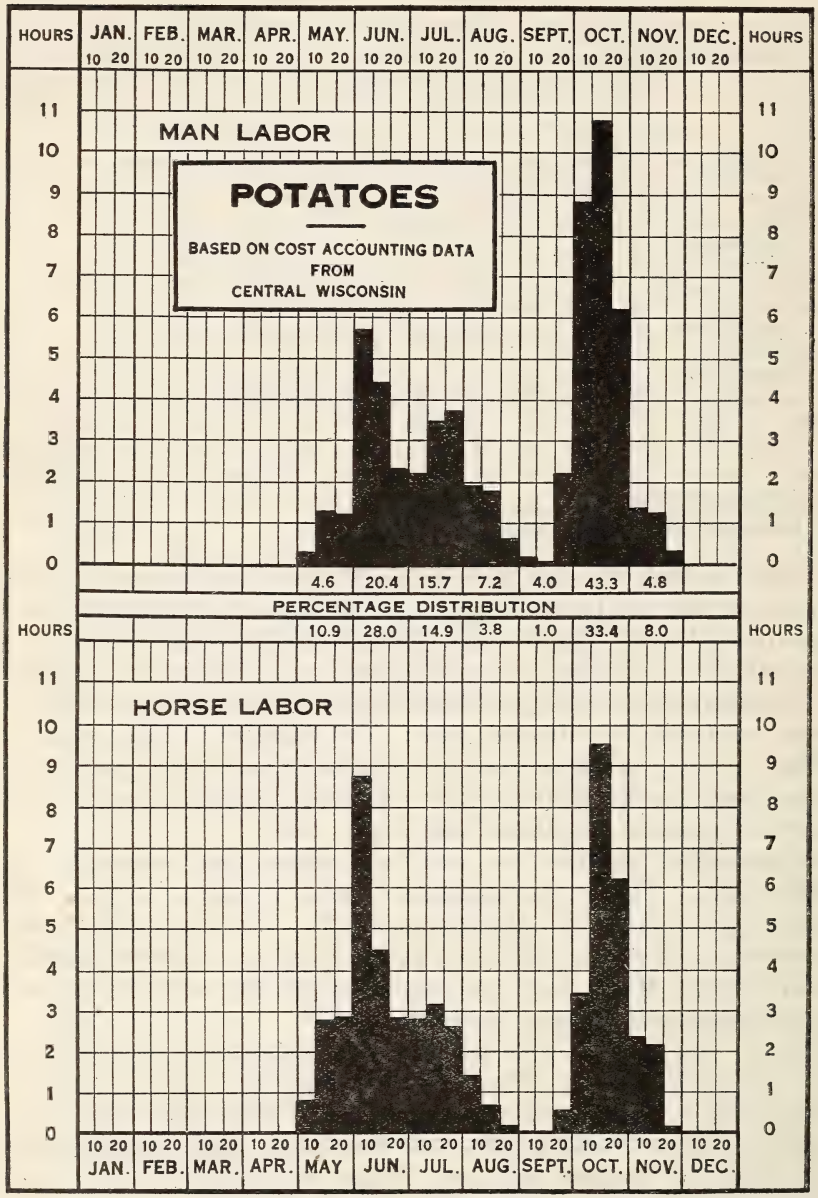
HOURS
JAN. FEB. MAR. APR. MAY. JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
POTATOES
BASED ON COST ACCOUNTING DATA FROM CENTRAL WISCONSIN
4.6 20.4 15.7 7.2 4.0 43.3 4.8
PERCENTAGE DISTRIBUTION
10.9 28.0 14.9 3.8 1.0 33.4 8.0
HORSE LABOR

Fig. 4.—Distribution of man labor and horse labor per acre for 14 farms, representing 161 acres of potatoes. Only marketing done directly from the field included. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 10.—*Potatoes: Percentage distribution of costs per acre.*

Item.	Steuben County, N. Y.		Grand Traverse County, Mich.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	28.8	27.3	32.8	30.3
Horse labor	26.0	24.7	18.9	17.4
Materials:				
Manure	12.1	11.5	14.3	13.2
Seed	12.3	11.7	14.4	13.3
Fertilizer	2.0	1.9	.....	.....
Spray material	1.4	1.4	2.1	1.9
Total materials	27.8	26.5	30.8	28.4
Other costs:				
Overhead	6.6	6.3	5.0	4.6
Machinery	8.7	8.2	7.6	7.0
Miscellaneous	2.1	2.0	4.3	3.9
Loss on abandoned acreage	.....	.....	.6	.5
Total other costs	17.4	16.5	17.5	16.0
Land charge	.....	5.0	.....	7.9
Value of land per acre	$80		$117	

SUGAR BEETS.

During the years 1915, 1916, and 1917 enterprise records were obtained in three districts within each of the regions where the sugar beet is grown as one of the important crops. The acreage represented was as follows: California, 14,139; Utah-Idaho, 3,029; Colorado, 9,913; Montana, 8,849; Michigan and Ohio, 4,280—total, 40,210 acres. The basic requirements for this crop have been worked out on a basis slightly different from that used in the case of other staples, like corn and wheat. (See Table 11.) In view of the fact that a rather large amount of the hand labor was performed on a contract basis, it was not thought advisable to separate the work prior to harvest from the work performed in harvesting the beet crop.

Considerable variation was found in the practices which obtained with reference to the hand work on sugar beets. In the three California districts and in the Billings area the hand work was all done on a contract basis. In several of the other districts, like Greeley and Rocky Ford, the farm operator with the aid of his family did a small part of this work and the remainder was done on a contract basis. More than half of the hand labor in the Garland and Fort Morgan districts was done by the operator, while in the Provo area a relatively small amount of the hand labor was let on contract. The cash paid out for contract labor has been converted to hours by using a rate of 25 cents per hour, which appears to be reasonable for the period under study.

Certain important factors are to be considered in comparing the man labor requirements by districts. First, California operators

used somewhat larger equipment than operators in other districts, and this is reflected in the man labor utilized per acre. Second, in Utah, Idaho, Colorado, and Montana, sugar beets are grown under irrigation, which increases the number of man hours per acre. Third, the extent of the enterprise, together with the type of soil, will influence the requirement for man labor. Fourth, the sugar beet is a heavy crop to handle, and, since districts differ in yield, the lifting and hauling to market may show considerable range in the total time utilized.

The quantity of seed used in the respective districts showed considerable uniformity. At the time this survey was made approximately 15 pounds per acre was the customary amount for practically all districts. The seed requirements as given represent one planting, and also a small amount of replanting.

Farm manure was applied in all of the districts visited. However, this factor was much less important in the California districts than elsewhere. A review of the detailed reports which have been issued in connection with this study will indicate some of the variations that occured relative to the application of farm manure.[1] Commercial fertilizer was applied only in the Michigan and Ohio districts.

TABLE 11.—*Sugar beets: Labor and material requirements per acre, (1,320 records, 1914–1916).*

Region.	Number of records.	Yield per acre.	Farmers' labor.		Contract labor.		Total hours per acre.		Seed.	Manure.	Fertilizer.	Per cent of operating expenses[a] covered by foregoing.
			Machine.	Hand.	Cash per acre.	Equivalent hours.	Man.	Horse.				
California:		*Tons.*	*Hrs*	*Hrs.*					*Lbs.*	*Tons.*	*Lbs.*	
Los Angeles	81	14.5	27.7	.....	$15.01	60.0	87.7	109.3	20.7	(b)	.....	84
Oxnard	45	9.5	20.2	.....	14.82	59.3	79.5	111.5	16.6	(b)	.....	85
Salinas	39	15.6	25.7	.....	18.87	75.5	101.2	124.3	14.6	(b)	.....	85
Utah-Idaho:												
Garland	79	14.8	36.7	21.2	18.87	75.4	133.3	98.5	14.7	5.1	.....	87
Provo	58	15.0	58.8	48.4	5.90	23.6	130.8	117.1	14.9	7.0	.....	86
Idaho Falls	36	13.6	34.2	16.0	17.29	69.2	119.4	79.3	14.7	6.3	.....	83
Colorado:												
Greeley	195	15.6	48.5	6.3	17.26	69.1	123.9	104.5	18.0	8.3	.....	91
Fort Morgan	66	13.6	45.3	18.7	13.52	54.1	118.1	103.0	21.1	4.4	.....	88
Rocky Ford	106	13.0	56.0	4.9	14.11	56.4	117.3	132.7	21.7	3.6	.....	90
Montana:												
Billings	305	10.8	41.8	.....	18 64	93.2	135.0	94.2	17.2	4.5	.....	93
Michigan-Ohio:												
Caro	134	9.7	39.4	5.1	15.26	61.0	105.5	80 0	15 6	2.0	92	90
Alma	53	11.4	50.3	10.3	13.55	54.2	114.8	95.3	15 3	2.7	62	90
Grand Rapids	36	10.2	45.3	15.4	12.66	50.6	111.3	93.8	14.2	2.8	94	90
Northwestern Ohio	97	13.2	38.6	5.8	17.24	69.0	113.4	79.1	15.2	(b)	61	89

[a] Excluding interest on land.

[b] Manure applied on negligible number of farms.

[1] References:

U. S. Dept. of Agr. Bulletin 693. Farm Practice in Growing Sugar Beets in Utah and Idaho.

U. S. Dept. of Agr. Bulletin 726. Farm Practice in Growing Sugar Beets in Colorado.

U. S. Dept. of Agr. Bulletin 735. Farm Practice in Growing Sugar Beets in the Billings Region, Montana.

U. S. Dept. of Agr. Bulletin 748. Farm Practice in Growing Sugar Beets in Michigan and Ohio.

U. S. Dept. of Agr. Bulletin 760. Farm Practice in Growing Sugar Beets in California.

U. S. Dept. of Agr. Bulletin 963. Cost of Producing Sugar Beets in Utah and Idaho, 1918–1919.

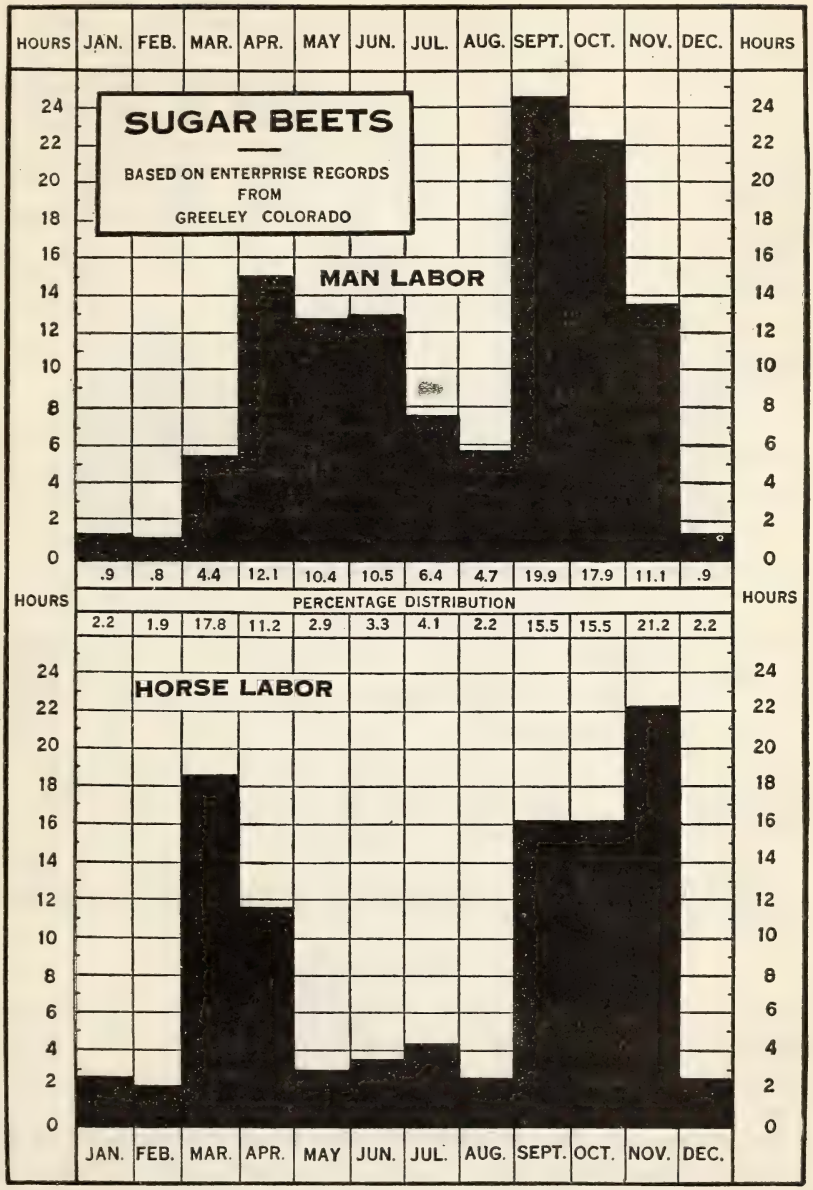

FIG. 5.—Distribution of man labor and horse labor by months, as shown by 195 enterprise survey records covering 2 years and involving the production of 5,028 acres of sugar beets. The total man labor includes operator's labor and contract labor, which has been converted to equivalent hours. Black bars indicate total hours spent per acre during periods of one month.

TABLE 12.—*Sugar beets: Percentage distribution of costs per acre.*

Item.	Weld County, Colo.		Tuscola County, Mich.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	53.9	38.3	57.1	49.1
Horse labor	22.4	16.0	19.5	16.8
Materials:				
Seed	3.5	2.4	5.7	4.9
Manure	10.8	7.6	4.6	4.0
Fertilizer	.....	.....	2.9	2.5
Water	1.0	.7	.....	.....
Total materials	15.3	10.7	13.2	11.4
Other costs:				
Machinery	4.0	2.8	5.0	4.3
Overhead	4.4	3.2	5.2	4.4
Total other costs	8.4	6.0	10.2	8.7
Land charge	.....	29 0	.....	14.0
Value of land per acre	$187		$102	

TABLE 13.—*Tobacco: Labor and material requirements per acre.*

Region.	Number of records.	Yield.	Man labor.			Horse labor.			Manure.	Per cent of operating expense[a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.		
		Lbs.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Tons.*	
Wisconsin	19	1,300	90.8	104.3	195.1	65.5	25.2	90.7	8	77.8
Kentucky (Burley)[b]	81	1,141	170.6	204.4	375.0	68.5	29.5	98.0	.....	75
Kentucky (dark)	70	825	146.3	115.7	262.0	60.7	28.3	89.0	.....	75

[a] Excluding interest on land.
[b] See Kentucky Bulletin 229, "The Cost of Producing Tobacco in Kentucky," by W. D. Nicholls, College of Agriculture, Kentucky, and F. W. Peek, Office of Farm Management and Farm Economics, U. S. Department of Agriculture.

TOBACCO.

Because of the large quantity of skilled labor required in the production of tobacco and the long period over which the labor is distributed, this crop competes with practically every other farm enterprise. Wherever it is grown, therefore, it is usually the chief source of income and all other enterprises are more or less neglected in the interest of the tobacco crop. Labor, machinery, and building costs are the three chief factors in the operating cost of tobacco production.

The materials used are seed, paper, twine, fuel, and in some sections small quantities of poison, used for killing worms. The amounts of all these supplies are, however, very small and of very little importance compared with the other cost factors, seed usually

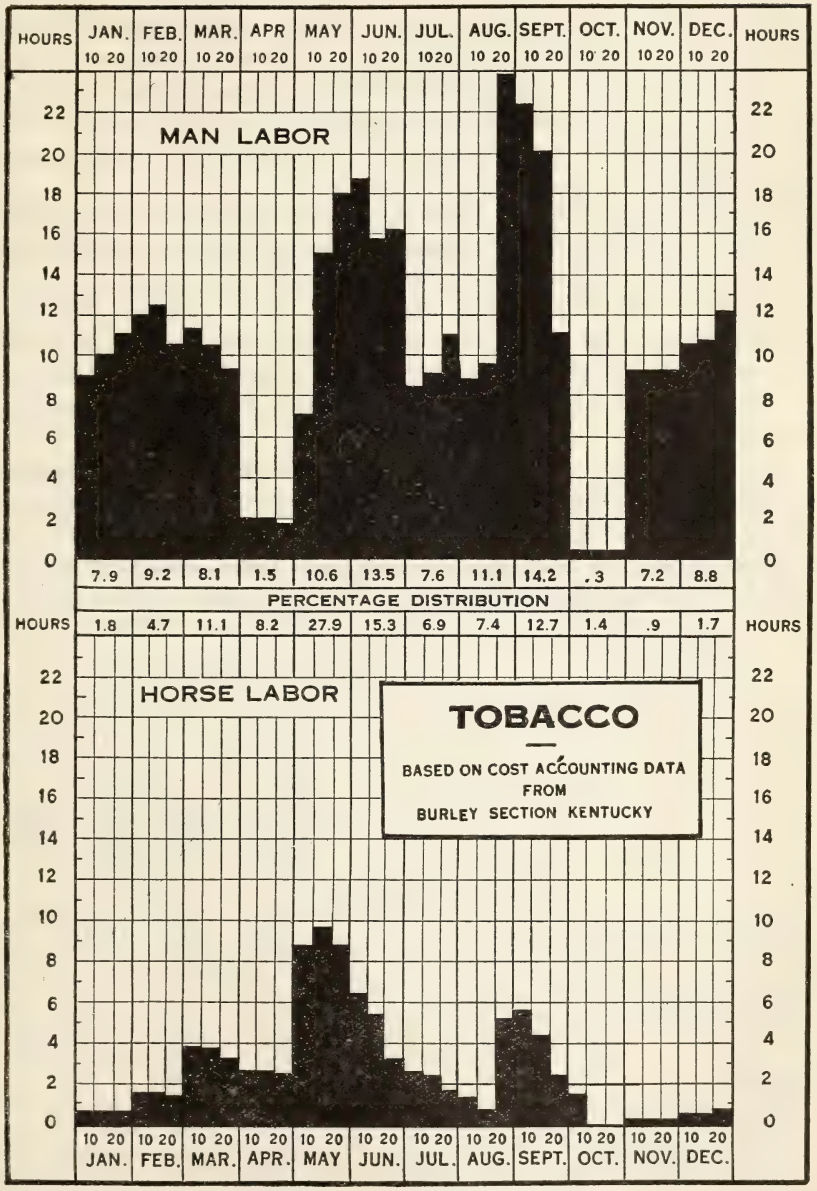

FIG. 6.—Distribution of man labor and horse labor as shown by reports from 12 farms. Labor for marketing included. Black bars indicate total hours spent per acre during 10-day periods.

amounting to about one ounce per acre, while the paper and twine used are very often paid for by the purchaser of the crop.

On the Kentucky farms visited the crop was grown mostly on new land, with only small quantities of fertilizer and manure, which is quite different from the practice on the Wisconsin farms, where it is customary to apply practically all of the farm manure to the tobacco land. The labor of hauling manure is included in all of the above records, and for Wisconsin this amounted to about 9 man hours and 16 horse hours per acre.

After the tobacco is harvested it is cured in sheds or barns which are built especially for the tobacco crop, and because of the large space required, the investment in these buildings becomes a considerable item, even though they may be of very simple construction.

For Wisconsin the yearly cost for buildings ranged from $6 to $10 per acre, while in Kentucky it went up as high as $42, with an average cost of $27.71 for the Burley district and $10.01 for the dark tobacco district.

In many sections of the country crop insurance is also becoming an important cost factor. In Wisconsin this item was not common at the time these records were obtained; hence insurance was left out of the account. In Kentucky, on the other hand, insurance was included. In the Burley section the average cost per acre was $11.57, while in the dark tobacco area it was $6.25 per acre (1919).

TABLE 14.—*Tobacco: Percentage distribution of costs per acre.*

Items.	Kentucky.		Wisconsin.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	64.0	42.0	49.0	45.3
Horse labor	10.3	6.7	16.8	15.4
Materials:				
Seed, canvas, etc	2.5	1.7	1.2	1.2
Manure and fertilizer	.7	.5	10.8	10.0
Total materials	3.2	2.2	12.0	11.2
Other costs:				
Machinery	1.8	1.2	4.3	3.9
Barns	14.6	9.6	12.8	11.8
Insurance	6.1	4.0	.....	.....
Overhead	.....	.....	5.1	4.5
Total other costs	22.5	14.8	22.2	20.2
Land charge	.....	[a] 34.3	.....	7.9
Value of land per acre	[b]		$100	

[a] Includes taxes, interest, and overhead.

[b] From $200 to $600.

BEANS.

The acreage of beans represented in Table 15 is as follows: New York, 540; Michigan, 462; Wisconsin, 349; California (irrigated), 805; California (dry), 1,433; Colorado (irrigated), 853; Colorado (dry), 860; New Mexico (dry), 1,850; Idaho (dry), 864—total, 8,016 acres. These records pertain to the crop year 1917.[1]

In all sections except Ventura County, Calif., the farmer, with the assistance of his hired help, performed all the labor involved in growing field beans. In the latter area, however, thrashing was done at a contract rate per hundred pounds. Since the farm labor had no part in doing the thrashing on these farms, it was impossible to report the time required for this work in terms of man hours and horse hours.

In the eastern areas, New York, Michigan, and Wisconsin, the operations entering into the production of field beans were very similar. The one outstanding difference was in the method of harvesting in Wisconsin. In that State beans are thrashed from the stack in the field, while in New York and Michigan they are thrashed in the barn. Of the three States visited the labor required for seed-bed preparation was lowest in Wisconsin, where the light soil type was the factor mainly influencing the labor required in seed-bed preparation. In New York and Michigan the land was spring-tooth-harrowed 3.7 times and 2.9 times, respectively.

The labor requirements in irrigated bean areas such as Stanislaus County, Calif., and Weld County, Colo., differ somewhat from those in dry-land areas. Naturally more labor is required on farms where water is applied artificially than on farms which depend upon the annual rainfall. Of all the regions visited, the labor requirements in the lima bean areas of Ventura County, Calif., were the greatest. Here considerable work was done in an attempt to eradicate morning glory, which is a serious weed pest in this region.

No manure was applied to the bean crop in the dry land areas of New Mexico and Colorado or to the bean areas of Ventura County, Calif., or to the dry-land beans of Idaho. Twenty-six per cent of the total bean land of New York, 22 per cent of the bean acreage represented in Wisconsin, 12 per cent of the irrigated bean land of Colorado, and 4 per cent of the irrigated bean land in California received applications of farmyard manure. New York, Michigan, and Wisconsin were the only regions which used commercial fertilizer.

The seed requirements varied considerably in different districts. The principal factors which governed the quantity of seed used are the number of seed per pound, the width of row, and the moisture available.

[1] The data for Table 15 are taken from an unpublished report prepared by R. S. Washburn, on file in the Office of Farm Management and Farm Economics.

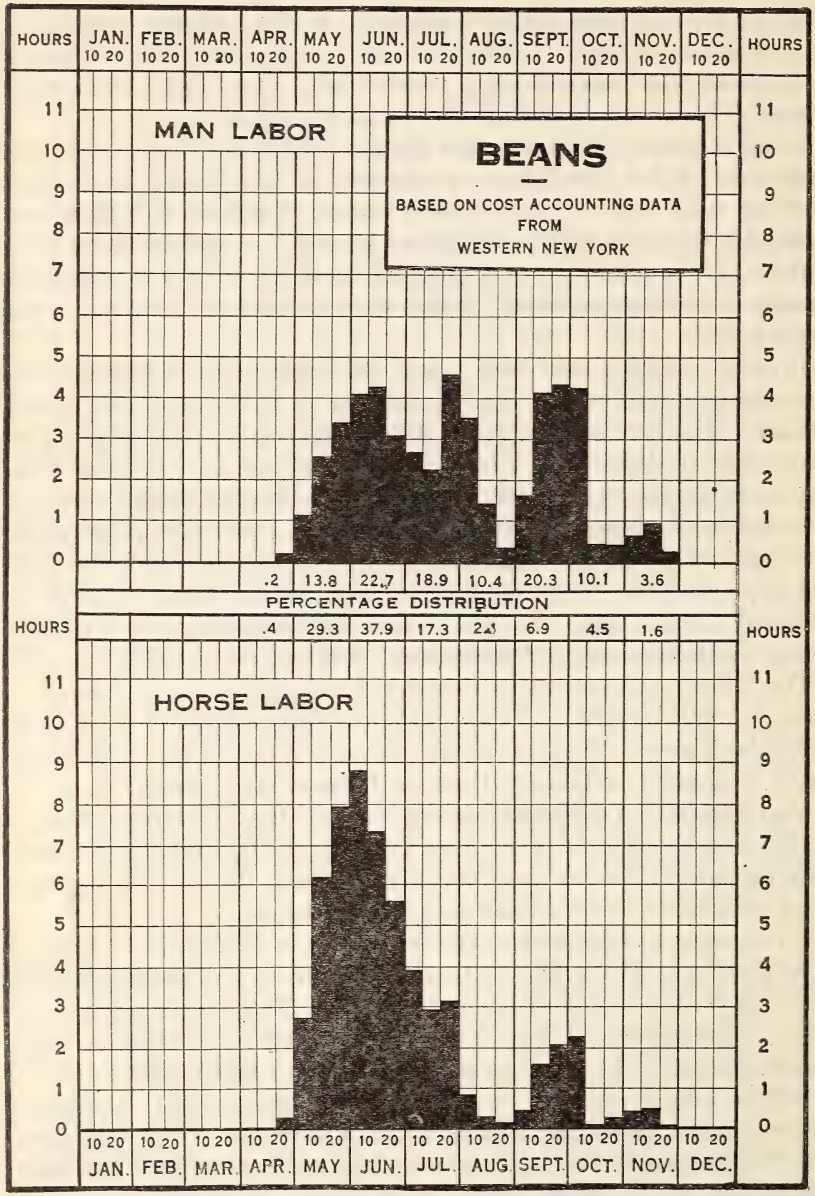
HOURS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
BEANS
BASED ON COST ACCOUNTING DATA FROM WESTERN NEW YORK
.2 13.8 22.7 18.9 10.4 20.3 10.1 3.6
PERCENTAGE DISTRIBUTION
.4 29.3 37.9 17.3 2.3 6.9 4.5 1.6
HORSE LABOR

FIG. 7.—Distribution of man labor and horse labor per acre for 12 farms, involving the production of 164 acres of beans. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 15.—*Field beans: Labor and material requirements per acre (166 records, 1917).*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Manure.	Fertilizer.	Coal.	Per cent of operating expense covered by foregoing.[a]
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.					
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Tons.*	*Lbs.*	*Lbs.*	
New York	26	10.9	27.6	14.3	41.9	53.3	8.2	61.5	50	3.6	95	62	67
Michigan	23	10.5	27.0	12.4	39.4	42.9	7.1	50.0	46	1.3	30	86	67
Wisconsin	16	7.3	20.2	12.1	32.3	36.2	8.7	44.9	66	3.4	7	64	74
Average			25.6	13.1	38.7	45.5	7.9	53.4					
California (irr.)	15	20.7	20.0	17.5	37.5	37.9	11.3	49.2	9–26	3.0	[b] 13.8		62
Colorado (irr.)	16	25.0	27.9	18.4	46.3	55.5	12.0	67.5	30	.4		124	68
Average			24.1	17.9	42.0	46.9	11.7	58.6					
Colorado (dry)	17	6.8	15.3	10.5	25.8	31.4	8.1	39.5	15			56	72
New Mexico (dry)	23	4.1	17.3	10.8	28.1	33.6	6.3	39.9	17		[b] 2.5		82
Average			16.4	10.7	27.1	32.6	7.1	39.7					
California (dry)	15	26.5	25.0	9.0	34.0	71.3	6.7	78.0	81		[b] 15.9		60
Idaho (dry)	15	9.7	21.3	8.9	30.2	42.0	7.0	49.0	20–27		[b] 3.7		79
Average			23.2	9.0	32.2	56.7	6.8	63.5					

[a] Excluding interest on land. [b] Sacks.

TABLE 16.—*Field beans: Percentage distribution of costs per acre.*

Items.	Columbia County, Wis.		Weld County, Colo.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	20.5	17.8	28.4	21.0
Horse labor	17.1	14.8	27.6	20.4
Handling charge	7.4	6.4	3.1	2.3
Materials:				
Manure	10.1	8.7	3.6	2.6
Fertilizer	.2	.2		
Seed	25.2	21.8	8.0	5.9
Coal	.7	.6	.7	.6
Total materials	36.2	31.3	12.3	9.1
Water rent			3.0	2.2
Other costs:				
Thrashing	2.4	2.1	7.7	5.7
Equipment	7.4	6.4	7.3	5.4
Overhead [a]	9.0	7.7	9.8	7.2
Hail insurance			.8	.6
Total other costs	18.8	16.2	25.6	18.9
Land charge		13.5		26.1
Value of land per acre	$114		$247	

[a] Includes taxes and insurance.

GRAIN SORGHUMS.

The records available on the cost of producing kafir and milo (1917) covered acreage as follows: Texas, 2,408; Oklahoma, 1,276; Kansas, 642; total, 4,726 acres. (See Table 17).[1]

Kafir and milo are not handled in the same manner in all districts. About 50 per cent of the Texas growers plowed, and 50 per cent plank-listed before planting. Thirty-five per cent used the disk and 65 per cent used the spike-tooth harrow. In Oklahoma about 13 per cent plowed, 43 per cent listed, and approximately the same percentage disked. Occasionally it was necessary to harrow. Fifty per cent of the Kansas operators disked, 25 per cent listed, and 25 per cent plowed.

Three types of planters were used in putting in the kafir, namely, the lister planter, the corn planter with furrow openers attached, and what is known as the "knife planter." The latter type is used invariably on sod land.

There are two general methods of harvesting: (1) The heads are harvested from standing stalks and hauled to bins or stacked in the barnyard; (2) the corn is cut with a corn binder, shocked, and headed from the shock with a knife attached to the end gate or side of the wagon. The heads are then hauled to bins and fed, or they may be stacked and thrashed out later from the stack.

In general, 1917 yields were below the average. In some sections the crop made no grain and it had to be utilized as fodder or it was pastured or put into the silo. The latter method was unusual, although the number of silos in this territory has apparently increased within recent years.

TABLE 17.—*Kafir and milo: Labor and material requirements per acre (96 records, 1917).*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Manure.	Twine.	Per cent of operating expense covered by foregoing.[a]
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.				
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	*Tons.*	*Lbs.*	
Texas	40	20.8	9.7	6.7	16.4	29.5	8.8	38.3	3.8	.....	.5	67
Oklahoma	37	22.6	8.8	10.0	18.8	25.6	12.8	38.4	3.0	2.0	1.3	77
Kansas	19	23.2	11.4	12.9	24.3	26.4	15.4	41.8	5.1	5.3	3.6	78

[a] Excluding interest on land.

[1] From an unpublished report prepared by T. H. Summers, formerly employed by the Office of Farm Management and Farm Economics, U. S. Department of Agriculture.

TABLE 18.—*Kafir and milo: Percentage distribution of costs per acre.*

Item	Kansas.		Texas.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	21.2	18.7	27.0	20.8
Horse labor	22.7	20.0	37.8	29.2
Materials:				
Seed	.6	.5	1.2	.9
Manure	30.8	27.2	.....	.....
Twine	2.4	2.1	.8	.6
Total materials	33.8	29.8	2.0	1.5
Other costs:				
Thrashing	3.4	3.0	.....	.....
Machinery	10.0	8.8	24.1	18.6
Overhead [a]	8.9	7.9	9.1	7.0
Total other costs	22.3	19.7	33.2	25.6
Land charge	.....	11.8	.....	22.9

[a] Includes insurance and taxes.

WHEAT—SPRING AND WINTER.

The study from which our wheat records were obtained covered 42,847 acres of spring wheat, with a total production of 362,047 bushels, and 42,174 acres of winter wheat, with a total production of 635,124 bushels. The acreage was distributed by States as follows: North Dakota, 17,271; South Dakota, 9,500; Minnesota, 17,447; Kansas, 24,436; Nebraska, 10,986; and Missouri, 8,518. In all there were 481 records. (See Table 18.) [1]

The figures on man labor and horse labor are averages for the farms operated by horse labor exclusively, farms on which tractors or motor trucks were used not being included.

In the spring-wheat area 86 per cent of the total wheat acreage was plowed, and of this 20 per cent was handled with tractor power. The remainder of the wheat acreage was corn stubble and potato land, which was usually disk harrowed and planted directly to wheat without plowing. There was a wide variation in the winter wheat districts with respect to plowing. Twenty-one and 23 per cent, respectively, of the wheat land in Pawnee and Ford Counties, Kans., was plowed, while in some other districts as much as 60 to 98 per cent was plowed. In several of the western areas the lister was used as a substitute for the plow.

Contract thrashing was the rule in a few districts, and, since the farmer furnished no labor in these areas, the amount of harvest labor was influenced thereby. This was true particularly in Grand Forks

[1] See U. S. Dept. of Agr. Bulletin 843, "The Cost of Producing Wheat."

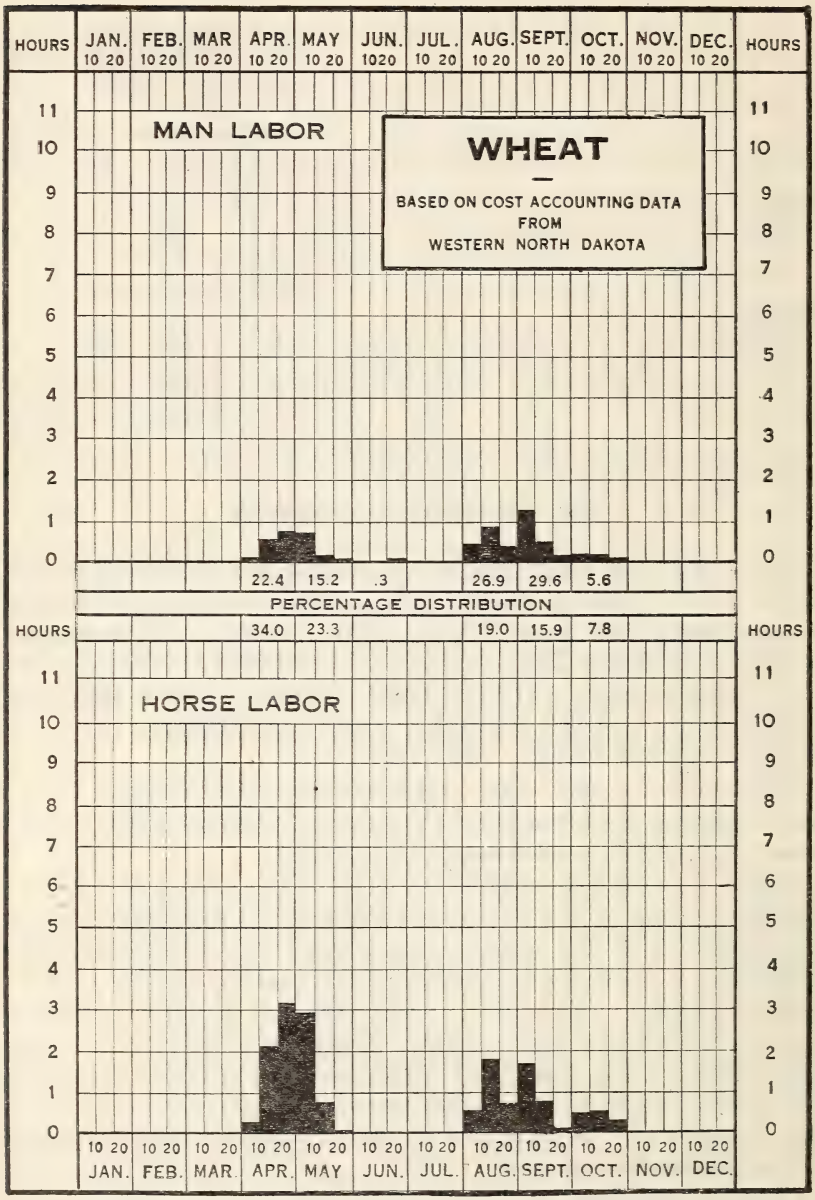

FIG. 8.—Distribution of man labor and horse labor per acre for 16 farms, representing the production of 960 acres of wheat. On eleven of these farms the thrasher furnished a part or all of the crew for thrashing. Black bars indicate total hours spent per acre during 10-day periods.

County, N. Dak., Spink County, S. Dak., and Pawnee and Ford Counties, Kans.

A light crop of straw in the spring-wheat region accounts in part for the low twine requirements in these districts. The header was used on 90 per cent of the wheat acreage in Morton County, N. Dak. The header was also used extensively in several of the winter-wheat districts.

Eighty per cent of the farmers in Saline County, Nebr., reported the use of manure. In Ford County, Kans., and Keith County, Nebr., only 1 per cent of the wheat acreage was manured. Here manure appears to have its greatest value as a top dressing, to prevent blowing. Eight per cent of the total wheat acreage received an application of manure and straw in the spring-wheat districts, and in the winter-wheat belt only 5 per cent of the total area was covered. Manuring may therefore be considered a minor operation in the production of wheat.

Commercial fertilizer was not used in any of the areas visited except Missouri, and in this State not to an appreciable extent except in Jasper County.

TABLE 19.—*Wheat: Labor and material requirements per acre (481 records, 1919).*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Twine.	Per cent of operating expense[a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Ttoal			
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Lbs.*	
Spring wheat region:											
Grand Forks, N. D.	39	9.8	3.6	2.2	5.8	14.6	4.6	19.2	1.4	1.9	59
Morton, N. D.	39	4.4	5.4	3.8	9.2	19.6	6.1	25.7	1.2	.1	68
Spink, S. D.	39	9.9	3.1	3.0	6.1	14.8	5.3	20.1	1.2	1.5	62
Clay, Minn.	38	8.1	4.2	4.0	8.2	15.1	7.3	22.4	1.4	2.2	67
Traverse, Minn.	42	8.4	4.1	4.7	8.8	17.3	8.4	25.7	1.4	2.0	72
Winter wheat region:											
Ford, Kans.	32	13.3	2.8	4.8	7.6	12.0	8.8	20.8	.8	1.2	63
Pawnee, Kans.	32	13.9	2.6	4.7	7.3	11.7	8.0	19.7	1.0	.5	56
McPherson, Kans.	35	12.7	4.5	4.8	9.3	18.8	8.1	26.9	1.1	2.7	63
Saline, Mo.	29	16.3	5.1	8.1	13.2	18.5	11.1	29.6	1.3	2.8	63
Jasper, Mo.	30	19.2	8.1	9.4	17.5	26.8	12.7	39.5	1.2	2.3	75
St. Charles, Mo.	38	19.6	8.2	8.9	17.1	25.1	11.5	36.6	1.1	2.3	68
Phelps, Nebr.	30	10.8	3.7	5.5	9.2	13.0	8.6	21.6	1.0	2.7	69
Saline, Nebr.	35	18.1	6.7	8.1	14.8	24.7	12.4	37.1	1.4	3.7	71
Keith, Nebr.	23	18.1	2.7	6.9	9.6	9.3	10.1	19.4	.9	1.8	59

[a] Excluding interest on land.

TABLE 20.—*Wheat: Percentage distribution of costs per acre (1919).*

Item.	McPherson County, Kans.		Clay County, Minn.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	24.6	17.9	20.5	15.2
Horse labor	23.1	16.8	21.5	15.9
Materials:				
Seed and seed treatment	10.5	7.6	19.9	14.7
Manure and straw	1.8	1.3	2.3	1.7
Twine	2.8	2.0	2.9	2.1
Total materials	15.1	10.9	25.1	18.5
Other costs:				
Thrashing	12.6	9.2	6.8	5.0
Crop insurance	1.2	.9	3.1	2.3
Machinery	8.8	6.4	7.5	5.5
Tractor	1.5	1.1	3.9	2.8
Loss on abandoned acreage	3.1	2.2	.....	.....
Overhead [a]	10.0	7.3	11.6	8.6
Total other costs	37.2	27.1	32.9	24.2
Land charge	.....	27.3	.....	26.2
Value of land per acre	$134		$137	

[a] Includes taxes and insurance.

This investigation included a survey of 453 farms in the winter wheat belt. The following acreages were planted to wheat by these operators: Missouri, 5,397; Nebraska, 13,053; Kansas, 28,870; and Oklahoma, 14,423, making a total for all farms of 61,743 acres.

TABLE 21.[a]—*Labor and material requirements, winter wheat, 1920 (representing predominating practice in each region).*

[453 Records.]

Regions.	Man hours.			Horse hours.			Seed.	Twine.	Land value.
	Preparation and seeding.	Harvest.	Total.	Preparation and seeding.	Harvest.	Total.			
Missouri:							*Bushels.*	*Pounds.*	
Pike County	7.4	7.1	14.5	24.6	9.6	34.2	1.30	1.5	$122
Carroll County	7.3	9.3	16.6	26.1	13.0	39.1	1.23	2.2	219
Nebraska:									
Gage County	5.4	8.0	13.4	21.8	11.9	33.7	1.28	2.4	208
Clay County	4.3	5.5	9.8	18.3	9.5	27.8	1.21	2.4	171
Cheyenne County	3.4	5.2	8.6	14.0	9.8	23.8	.77	2.2	108
Kansas:									
Thomas County—									
Seeded	1.9	4.6	6.5	8.1	8.3	16.4	.74	.....	61
Vol	.7	4.6	5.3	3.2	8.3	11.5			
McPherson County—									
Shock thrashed	4.5	4.0	8.5	18.5	7.5	26.0	1.06	2.0	140
Stack thrashed	4.5	5.0	9.5	18.5	8.1	26.6			
Pawnee County	2.2	4.4	6.6	10.6	7.2	17.8	.94	.....	89
Oklahoma:									
Garfield County	4.9	4.3	9.2	20.1	6.9	27.0	1.07	2.5	120
Woodward County	3.8	4.2	8.0	14.4	8.3	22.7	.87	.....	44

[a] From preliminary report on the cost of producing wheat, by R. S. Washburn and L. A. Moorhouse.

In Table 21 are summarized the average labor and material requirements for all districts. The methods of handling the crop showed considerable variation even within the same region. The labor requirements represent the prevailing practices on the farms that were operated exclusively with horsepower.

In Thomas and Pawnee Counties, Kans., and Woodward County, Okla., the requirements are for headed grain, while in all other districts they are for grain cut with a binder. The labor requirements for the two Missouri districts, and Gage and Clay Counties, Nebr., are for conditions where all bundle haulers and field pitchers were furnished by the farmer. In Cheyenne County, Nebr., and for the shock thrashing in McPherson County, Kans., the farmer furnished no labor except the bundle haulers. In Pawnee County, and for the stack thrashing in McPherson County and the two Oklahoma districts, the requirements include no time for thrashing, which was all done by contract.

A division of the labor as to land preparation and seeding, and harvesting and marketing, indicates that the man-hours for the latter were slightly greater than for the former, while the horse-hours for seed-bed preparation and seeding exceeded those required for harvesting and marketing in all cases except for volunteer wheat in Thomas County, Kans. The man-labor and horse-labor requirements were highest in the two Missouri districts, where a relatively large percentage of the acreage was covered with tillage implements which were smaller than those used in other districts. Furthermore, in Missouri the farmers furnished a greater percentage of the thrashing crew.

The seed requirements per acre were governed mainly by the amount of annual rainfall. The rate of seeding ranged from an average of 0.74 of a bushel in Thomas County, Kans., a region of limited rainfall, to 1.30 bushels in Pike County, Mo., a region of abundant rainfall. The acre use of binder twine ranged from an average of 1.5 pounds in Pike County, Mo., to 2.5 pounds in Garfield County, Okla.

OATS.

Oats do not require so loose a seed bed as many of the other farm crops, and for this reason they are often sown on corn land without plowing. On the farms for which figures are available the following percentages of land were plowed: North Dakota, 92; Wisconsin, 80; Ohio, 80; Minnesota, 75; New York, 50; Illinois, 11. (See Table 22.)

TABLE 22.—*Oats: Labor and material requirements per acre (301 records).*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed per acre.	Fertilizer	Fuel (coal).	Twine per acre.	Per cent of operating expense[a] covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.					
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Lbs.*	*Lbs.*	*Lbs.*	
Minnesota	79	35.4	4.2	5.9	10.1	15.7	7.8	23.5	2.6	.....	.....	2.3	71
Wisconsin	92	35.7	6.0	9.0	15.0	16.3	7.7	24.0	2.2	.....	48.9	2.5	71
New York	9	50.4	8.3	10.5	18.8	18.0	7.6	25.6	2.4	192.1	69.5	2.6	70
Ohio	30	34.3	9.0	11.5	20.5	19.4	8.4	27.8	2.3	.....	49.5	2.2	71
Illinois	38	35.3	2.7	6.1	8.8	9.2	8.4	17.6	2.4	.....	43.8	2.1	61
North Dakota	53	33.0	2.9	2.7	5.6	13.0	4.4	17.4	2.0	.....	.....	1.9	59

[a] Excluding interest on land.

The low labor requirement for Illinois is largely explained by the fact that only 11 per cent of the ground was plowed. In North Dakota, which has the second lowest requirement for preparation and sowing, the highest percentage of plowed land is found, but the farmers of that State save time by using larger machinery and perhaps working faster because of their skill in handling small grain with machinery. The same reasons explain the low labor requirement for harvesting in that State.

The fuel used per acre for thrashing will vary with the size of the machine, the amount of straw per acre, etc. It will be noticed, however, that the variation in cost due to fuel is negligible. In Minnesota and North Dakota straw-burning engines were used, hence there is no charge for fuel.

For Illinois and North Dakota, because of the low labor and high machine charges, the percentage of total operating expense represented by labor and material is very much lower than for the other States.

TABLE 23.—*Oats: Percentage distribution of costs per acre.*

Item.	Illinois.		North Dakota.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
Man labor	17.9	8.7	23.4	16.4
Horse labor	24.9	12.2	19.9	14.0
Materials:				
Seed	14.4	7.0	11.7	8.2
Twine	2.7	1.3	3.6	2.5
Fuel	1.0	.5	.....	.....
Total materials	18.1	8.8	15.3	10.7
Other costs:				
Overhead	15.6	7.6	8.8	6.1
Machinery	10.7	5.2	8.4	5.9
Thrashing	12.8	6.2	24.2	17.0
Total other costs	39.1	19.0	41.4	29.0
Land charge	.....	51.3	.....	29.9
Value of land per acre	$100		$42	

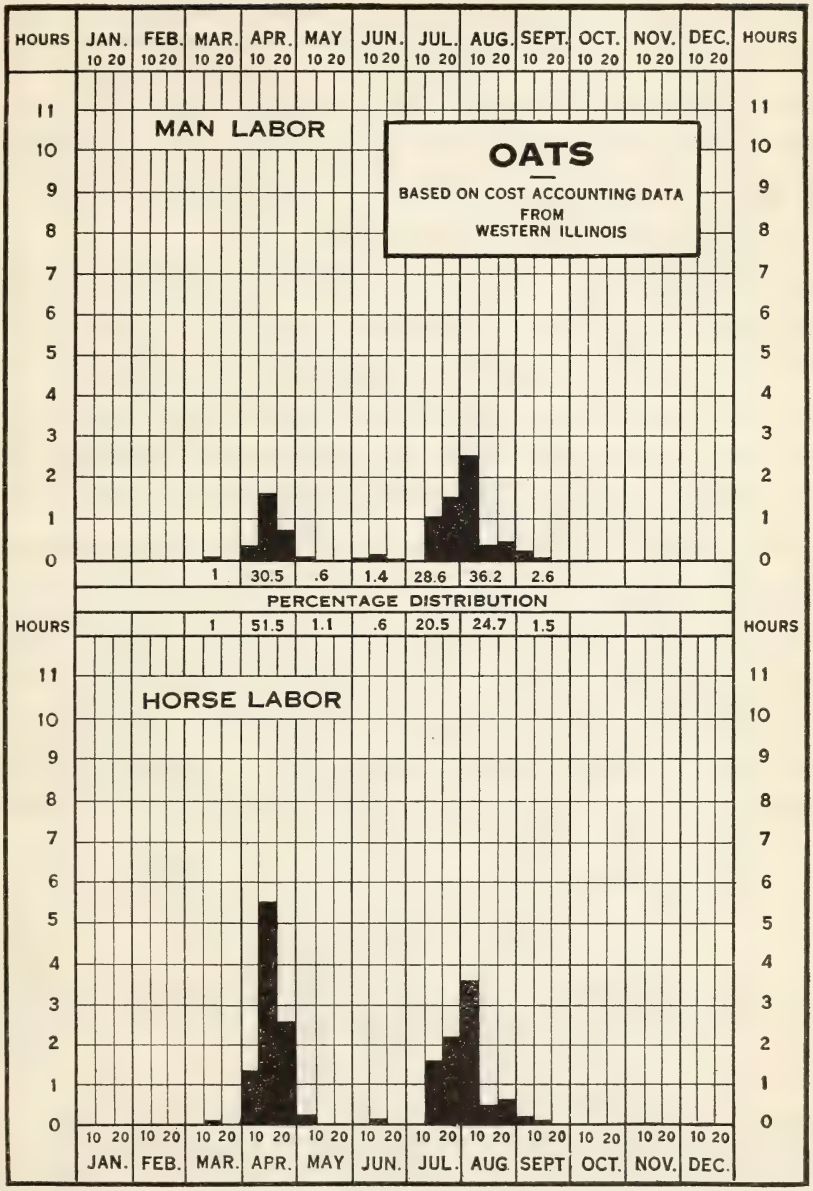
HOURS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
OATS
BASED ON COST ACCOUNTING DATA FROM WESTERN ILLINOIS
1 30.5 .6 1.4 28.6 36.2 2.6
PERCENTAGE DISTRIBUTION
1 51.5 1.1 .6 20.5 24.7 1.5
HORSE LABOR

FIG. 9.—Distribution of man labor and horse labor for 22 farms, which produced a total of 891 acres of oats. Black bars indicate total hours spent per acre during 10-day periods.

BARLEY.

For best results barley must be sown in a well-prepared seed bed, and consequently the land is generally plowed for this crop. The percentages of the land plowed for barley on the farms from which records for this crop are available are as follows: Minnesota, 87; North Dakota, 97; Wisconsin, 86; New York, 50. Variations in labor requirements are due chiefly to the different sizes of machines and power units used in different sections. It will be noted (Table 24) that in North Dakota there are over three horse hours per man hour, while in New York the ratio is about 1:1½.

Barley stands up well and is for this reason very popular as a nurse crop for grass seeding. When so used it is customary to sow less seed than usual per acre. In Wisconsin, for instance, where 43 per cent of the total barley acreage covered in this investigation was seeded to grass, the records show that about one-fourth bushel less seed than usual was sown per acre when used as a nurse crop. The fact that barley is often handled in a special way for the good of the grass seeding should be borne in mind when comparing its profitableness with that of other farm crops.

The differences in labor requirements for harvesting and thrashing barley are largely due to the variations in size of machinery used. The harvest labor requirement of barley is slightly lower than that of oats, for the reason that the barley produces less straw, stands better, and thrashes faster. In North Dakota 81 per cent of the crop was thrashed by contract; that is, all or a part of the crew was furnished by the thrasher. On these farms the harvest labor per acre was 1.8 man-hours and 3.4 horse-hours, as compared with 4.1 man-hours and 6.5 horse-hours per acre on farms where the entire crew was furnished by the farm operator.

TABLE 24.—*Barley: Labor and material requirements per acre (154 records).*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Fertilizer.	Fuel (coal).	Twine.	Per cent of operating expense covered by foregoing.[a]
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.					
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Lbs.*	*Lbs.*	*Lbs.*	
Minnesota	61	23.8	4.7	6.0	10.7	17.3	7.8	25.1	2.0	.....	.....	2.3	73
Wisconsin	37	27.3	6.4	10.5	16.9	18.6	8.7	27.3	1.7	.....	49.7	2.2	75
New York	9	32.4	6.9	9.6	16.5	14.6	7.8	22.4	2.1	195.0	77.6	2.7	75
North Dakota	47	20.7	2.8	2.2	5.0	13.1	4.0	17.1	1.8	.....	.....	1.8	59

[a] Excluding interest on land.

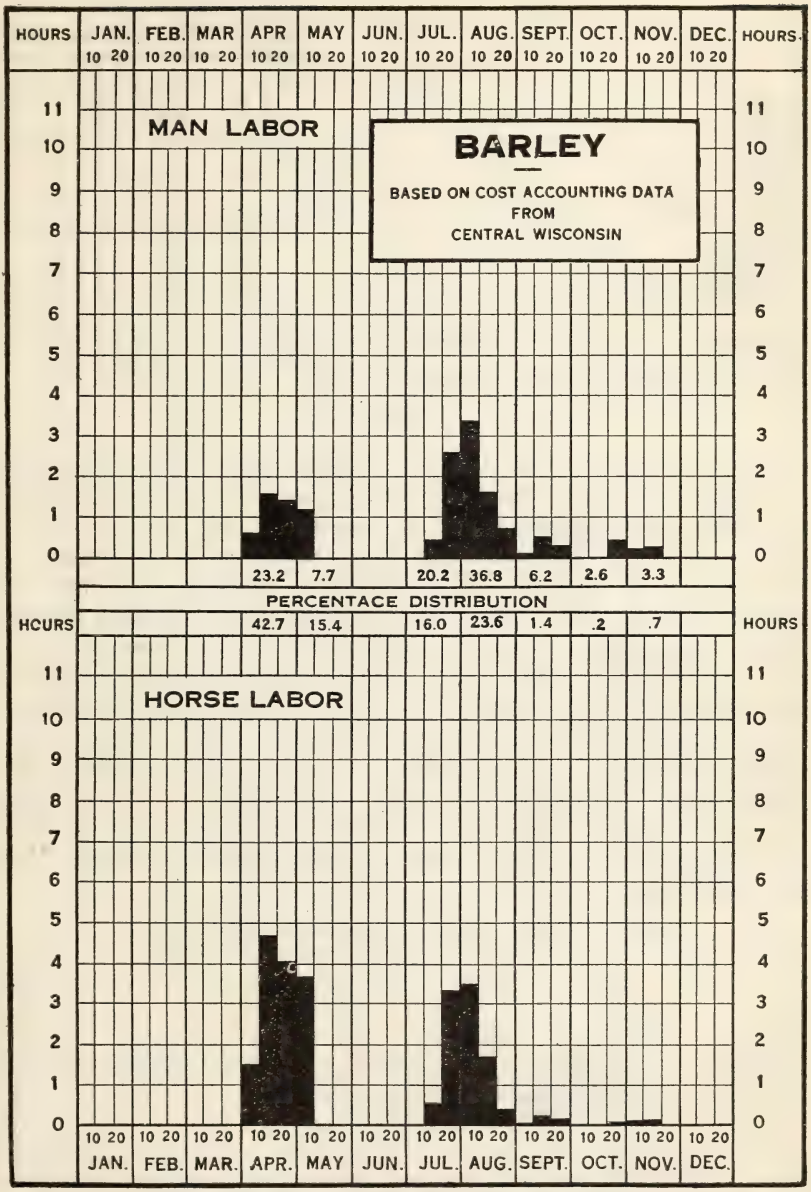
HOURS
JAN. FEB. MAR APR MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
BARLEY
BASED ON COST ACCOUNTING DATA FROM CENTRAL WISCONSIN
23.2 7.7 20.2 36.8 6.2 2.6 3.3
PERCENTAGE DISTRIBUTION
42.7 15.4 16.0 23.6 1.4 .2 .7
HORSE LABOR

FIG. 10.—Distribution of man labor and horse labor for 16 farms, representing the production of 175 acres of barley. Marketing labor not included. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 25.—*Barley: Percentage distribution of costs per acre.*

Items.	North Dakota.		Wisconsin.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	20.6	14.7	28.0	19.5
Horse labor	21.2	15.1	30.0	20.8
Materials:				
Seed	13.4	9.6	14.8	10.3
Twine	4.0	2.8	2.1	1.6
Fuel	.....	.....	1.0	.8
Total materials	17.4	12.4	17.9	12.7
Other costs:				
Overhead	9.7	7.0	8.3	6.2
Machinery	7.6	5.4	8.0	5.5
Thrashing	23.5	16.7	7.8	4.8
Total other costs	40.8	29.1	24.1	16.5
Land charge	.....	28.7	.....	30.5
Value of land per acre	$36		$72	

RYE.

Rye does best on good land, but because of its ability to produce a comparatively good yield on poor ground it is usually grown on the lighter soils. Because of its hardiness, rye also very often receives less care and attention than the other small grains. On some farms, for instance, it is regularly sown in standing corn, making the value of the seed and the labor cost for sowing the only charges for seeding. In other regions, like the sections studied in New York and New Jersey, rye is always sown on land that is plowed and prepared in the ordinary way. Such variations in methods, of course, are bound to result in considerable variations in the cost of producing the crop. In Wisconsin 75 per cent of the rye fields were plowed, while for Minnesota and Ohio the figures are 50 and 10 per cent, respectively. The causes underlying variations in the other cost factors for rye are the same as those already discussed under oats and barley.

TABLE 26.—*Rye: Labor and material requirements per acre.*

Region.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Fertilizer.	Fuel (coal).	Twine.	Per cent of operating expense covered by foregoing. (*a*)
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.					
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Lbs.*	*Lbs.*	*Lbs.*	
Minnesota	6	22.3	2.8	7.4	10.2	9.0	7.9	16.9	2.0	.....	.....	3.1	76
Wisconsin	12	16.2	4.5	9.9	14.4	12.3	8.5	20.8	1.1	.....	49.0	1.9	73
Ohio	10	14.6	6.0	10.4	16.4	11.9	7.5	19.4	1.9	.....	48.0	2.0	67
											Gal.		
New York	(*b*)	17.0	9.9	13.4	23.3	21.2	7.1	28.3	1.9	183.0	0.8	4.0	76
New Jersey	(*b*)	17.6	10.0	11.4	21.4	22.7	5.4	28.1	1.8	337.0	.....	2.8	74

a Excluding interest on land.
b Figures taken from the results of a special investigation.

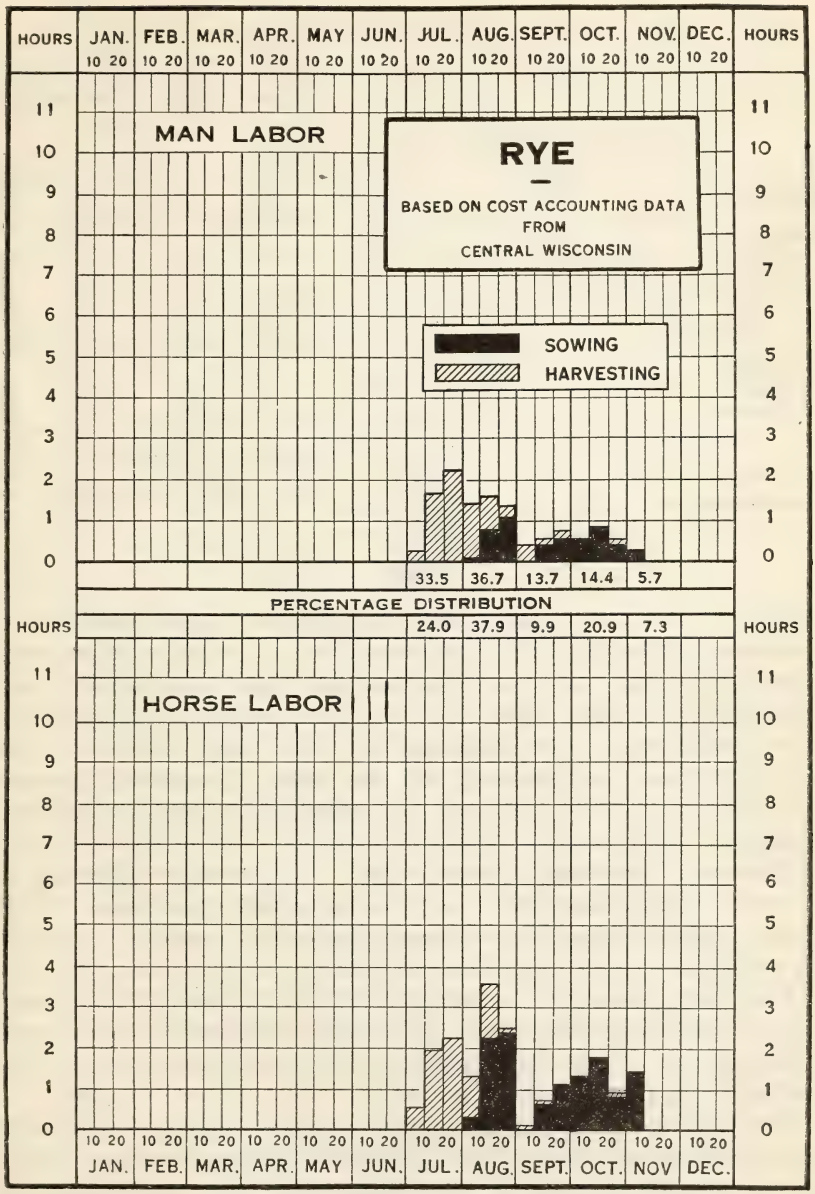

FIG. 11.—Distribution of man labor and horse labor for 12 farms, with a production of 133 acres of rye. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 27.—*Rye: Percentage distribution of costs per acre.*

Item.	Minnesota.		Ohio.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	21.7	16.0	29.3	21.6
Horse labor	42.6	29.6	17.6	13.0
Materials:				
Seed	9.8	7.0	17.4	12.8
Twine	2.1	1.5	1.4	1.0
Fuel	.....	.....	.3	.2
Manure	.....	.....	15.5	11.5
Total materials	11.9	8.5	34.6	25.5
Other costs:				
Overhead	5.0	3.6	1.2	.9
Machinery	9.8	7.4	11.5	8.5
Thrashing	9.0	6.5	5.8	4.3
Total other costs	23.8	17.5	18.5	13.7
Land charge	.....	28.4	.....	26.2
Value of land per acre	$70		$73	

HAY.

Most of the tame grasses used for hay are either biennials or perennials. This is a very important fact to consider when comparing crop costs. In view of the fact that these crops are not sown annually on the same fields, the cost of the seed is always prorated over several years, thus reducing the seed charge for each. Not only is the seed cost reduced, but the labor of preparing the seed bed, and also, in most instances, the sowing of the seed, are charged against the nurse crop, thus leaving only the value of the seed sown as the cost of obtaining a stand of hay. In the tables following on the cost of hay, labor refers only to harvesting operations. In all of the sections studied there appeared on some records a few hours for sowing and other miscellaneous work on the hay fields, but only in New York, where it is common to roll the hay land in the spring, is this labor of any importance. On the latter farms the time spent in taking care of the hay ground in the spring amounted to six-tenths of a man hour and seven-tenths of a horse hour per acre.

Seed is always one of the costs of producing tame hay and is given for all the States except Ohio, for which the records showed only the money cost of seeding. (See Table 28.) Seed and labor make up about three-fourths of the expenses of producing hay, and machinery and overhead make up the other one-fourth. A few farmers applied fertilizer to the hay land and a few reports showed that salt was used in the hay mow, but neither of these items is of

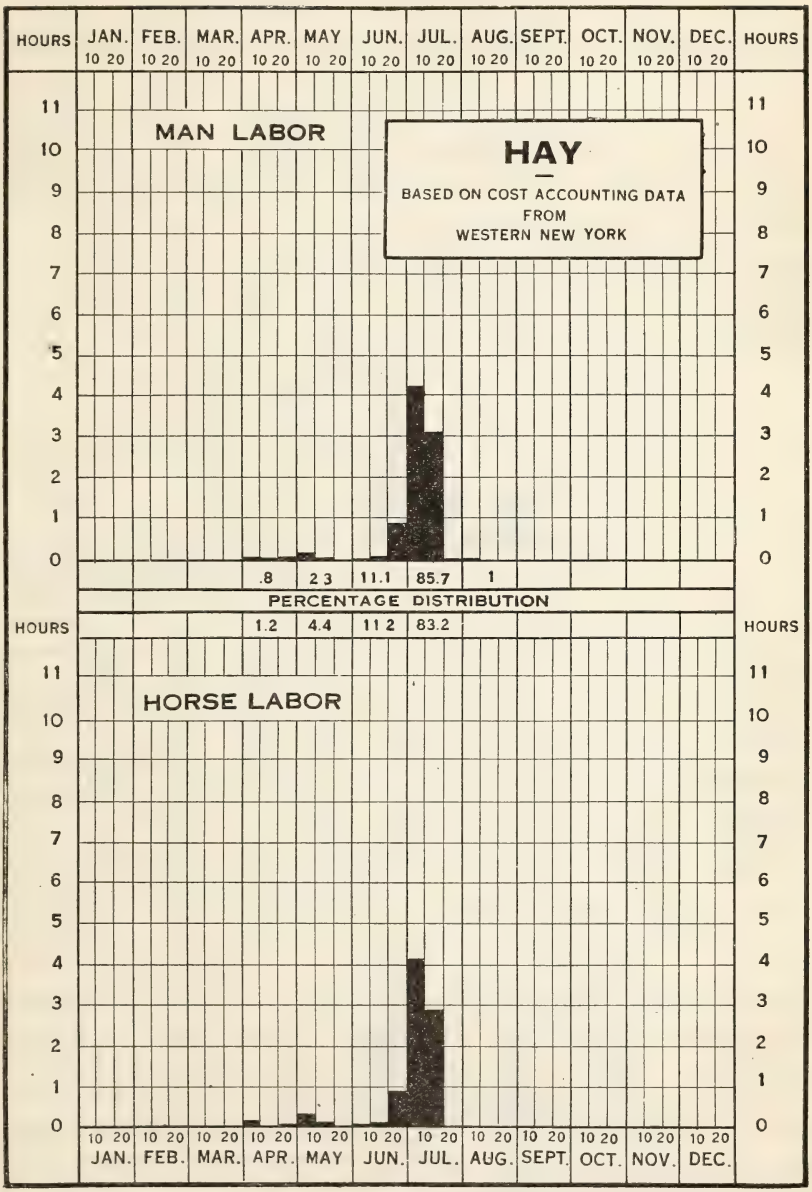
HOURS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
HAY
BASED ON COST ACCOUNTING DATA FROM WESTERN NEW YORK
.8 2 3 11.1 85.7 1
PERCENTAGE DISTRIBUTION
1.2 4.4 11 2 83.2
HORSE LABOR
0 1 2 3 4 5 6 7 8 9 10 11

FIG. 12.—Distribution of man labor and horse labor for 13 farms, including the production of 301 acres of hay. Black bars indicate total hours spent per acre during 10-day periods.

sufficient importance to be considered. Some farmers reported baling costs, but as baling was rather the exception than the rule, no baling costs have been counted.[1]

TABLE 28.—*Mixed tame hay: Labor and material requirements per acre (197 records).*

Region.	Number of records.	Yield per acre.	Man labor: Mowing, raking, and hauling.	Horse labor: Mowing, raking, and hauling.	Seed.		Per cent of operating expense covered by foregoing.[a]
					Timothy.	Clover.	
		Tons.	*Hours.*	*Hours.*	*Pounds.*	*Pounds.*	
Minnesota	11	1.5	7.8	10.1	4.6	4.0	74
Wisconsin	65	1.4	9.1	10.2	4.6	3.8	70
New York	23	1.4	7.9	7.7	9.2	4.9	82
Pennsylvania	37	1.5	7.5	7.8	9.1	10.5	80
Ohio	52	1.4	7.9	8.5	.....	.....	71
New England	9	1.6	10.7	9.5	10.0	[b] 12.0	77

[a] Excluding interest on land. [b] Timothy and red top.

TABLE 29.—*Mixed tame hay: Percentage distribution of costs per acre.*

Item.	New York.		Ohio.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	22.4	15.9	33.9	17.7
Horse labor	17.6	12.5	21.3	11.2
Materials:				
Seed	25.3	17.9	15.3	8.0
Manure	16.3	11.5	.....	.....
Total materials	41.6	29.4	15.3	8.0
Other costs:				
Overhead	10.0	7.0	.6	.3
Machinery	8.4	6.0	28.9	15.1
Total other costs	18.4	13.0	29.5	15.4
Land charge	.....	29.2	.....	47.7
Value of land per acre	$83		$51	

Clover usually produces two crops, but very often the second crop is either pastured, cut for seed, or plowed under as a green manure crop. Table 30 shows that 50 per cent of the clover land was cut for hay a second time in Minnesota, though only 33 per cent was cut in Ohio and Wisconsin. On the New York and Illinois farms covered by these records the second crop was in all instances used either for seed or for pasture.

[1] References:
Dept. Bul. 578. A Study of Haymaking Crews and Labor Costs.
Dept. Bul. 641. Farm Practice in the Production of Hay in Steuben County, N. Y., and Washington County, Pa.

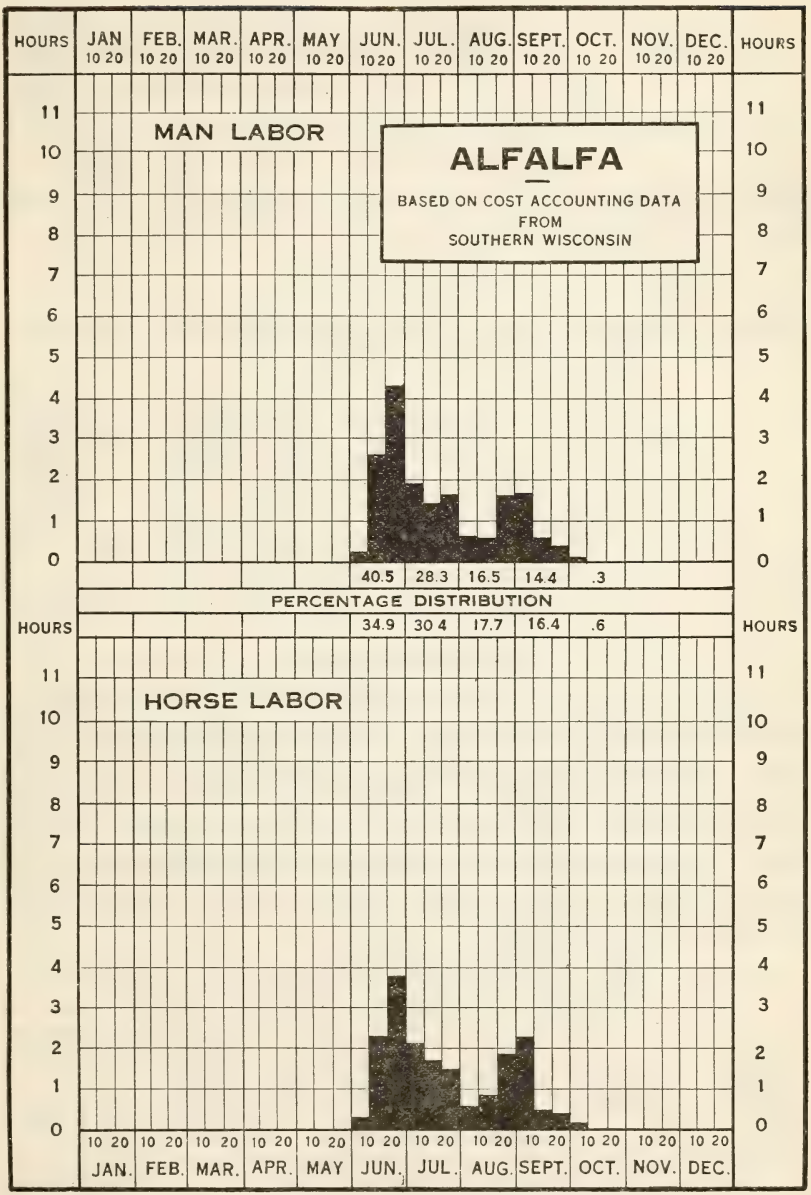

FIG. 13.—Distribution of man labor and horse labor for 20 farms, representing the production of 128 acres of alfalfa. The reports show that the first and second crops may overlap during the period July 10 to 20. Black bars indicate total hours spent per acre during 10-day periods.

TABLE 30.—*Clover hay: Labor and material requirements per acre (99 records).*

Region.	Number of records.	Yield per acre.	Man labor: Mowing, raking, and hauling.	Horse labor: Mowing, raking, and hauling.	Seed.	Per cent of operating expense covered by foregoing.[a]
		Tons.	*Hours.*	*Hours.*	*Pounds.*	
Minnesota	31	1.5	8.6	12.4	10.7	79
Wisconsin	37	2.2	14.2	15.5	7.2	79
New York	7	2.0	8.9	9.9	10.1	80
Ohio	20	1.6	11.6	10.5	.....	76
Illinois	4	1.3	8.7	10.0	7.2	.....

[a] Excluding interest on land.

TABLE 31.—*Timothy hay: Labor and material requirements per acre (49 records).*

Region.	Number of records.	Yield per acre.	Man labor: Mowing, raking, and hauling.	Horse labor: Mowing, raking, and hauling.	Seed.	Per cent of operating expense covered by foregoing.[a]
		Tons.	*Hours.*	*Hours.*	*Pounds.*	
Minnesota	13	1.3	8.0	11.4	5.4	80
Wisconsin	21	1.4	9.1	11.0	5.5	82
Ohio	8	1.2	7.9	9.2	.....	75
Iowa	7	1.8	7.5	8.8	4.0	70

[a] Excluding interest on land.

Alfalfa grows rapidly, and under favorable conditions, will produce several cuttings each season. To know the number of cuttings is rather important when studying cost figures for this crop and, therefore, figures on number of cuttings are given in the accompanying table (Table 32). Costs for alfalfa other than harvesting are about the same as those given for mixed hay, but the equipment cost is somewhat larger for alfalfa, which tends to reduce the proportion represented by seed and labor.

TABLE 32.—*Alfalfa: Labor and material requirements per acre (105 records).*

Region.	Number of records.	Yield per acre.	Man labor: Mowing, raking, and hauling.	Horse labor: Mowing, raking, and hauling.	Seed.	Per cent of operating expense[a] covered by foregoing.	Part of acreage cut more than once.	
							Two times.	Three times.
		Tons.	*Hrs.*	*Hrs.*	*Lbs.*		*Per cent.*	*Per cent.*
Minnesota	37	2.5	20.2	24.1	11.7	73	80	60
Wisconsin	39	2.4	21.8	21.2	18.0	72	93	59
Iowa	7	2.0	14.0	22.4	15.0	69	100	72
Illinois	3	1.9	19.2	23.7	13.7	63	.....	.....
Ohio	7	1.8	17.4	13.8	.....	67	86	58
New York	12	2.2	14.4	16.0	15.3	69	91	64

[a] Excluding interest on land.

Besides clover, timothy, and alfalfa, several other crops may be used for hay. Many farmers depend largely upon peas and oats and other grains for their hay, but on most farms these crops are harvested for hay only in case of emergency. The seed used for the grain hay is very often a mixture of peas and oats, although the records indicate that the other grains are also used. The amounts of seed given per acre in the following table consist of about two-thirds oats and the remainder peas, rye, wheat, etc.:

TABLE 33.—*Wild and grain hays: Labor and material requirements per acre (83 records).*

Region.	Kind of hay.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Per cent of operating expense[a] covered by foregoing.
				Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.		
			Tons.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	
Minnesota	Wild	52	1.3	.....	7.6	7.6	.....	10.9	10.9	.....	46
Do	Millet	8	1.7	6.9	11.3	18.2	23.2	12.7	35.9	35.9	69
North Dakota	do	5	1.9	3.2	5.1	8.3	14.3	8.1	22.4	21.0	83
Wisconsin	Grain	8	1.2	8.1	8.5	16.6	16.4	8.1	24.5	75.0	80
Illinois	do	2	.5	3.1	3.4	6.5	8.1	5.5	13.6	42.0	.....
Minnesota	do	8	1.3	2.9	8.3	11.2	8.9	9.8	18.7	70.4	.....

[a] Excluding interest on land.

GRASS-SEED CROPS.

On many farms it is customary to use the second cutting of clover for the production of seed. When so used it has been the practice to divide the annual charges against the field between the two cuttings. When only two cuttings are made the hay and clover seed crops are made to carry equal proportions of such items as the seeding cost, land rent, taxes, etc., or two-thirds of the expense may be charged to the hay, if two crops of hay and one crop of seed are obtained during the same season.

With timothy, which usually produces only one crop a year, this question does not arise. (See Tables 34, 35, and 36.)

TABLE 34.—*Timothy seed: Labor and material requirements per acre.*

Region.	Number of records.	Yield per acre.	Man labor.		Horse labor.		Seed.	Twine.	Per cent of operating expense covered by foregoing.[a]
			Harvest.	Total.	Harvest.	Total.			
		Bush.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	*Lbs.*	*Lbs.*	
Minnesota	12	4.0	6.3	6.3	7.6	7.6	5.6	1.9	45
Wisconsin	4	1.7	3.9	3.9	4.4	4.4	4.6	.8	62
Iowa	10	5.8	6.9	6.9	7.6	7.6	4.0	3.1	49
Ohio	3	1.7	6.0	6.0	5.0	5.0	.....	.....	64
New York	.....	6.3	10.0	10.0	8.9	8.9	.....	.....	.....

[a] Excluding interest on land.

TABLE 35.—*Timothy seed: Percentage distribution of costs per acre.*

Item.	Iowa.		Minnesota.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	20.6	9.5	22.0	9.5
Horse labor	16.3	7.5	14.0	6.0
Materials:				
Seed	7.7	3.3	4.8	2.0
Twine	4.8	2.2	4.4	1.6
Total materials	12.5	5.5	9.2	3.6
Other costs:				
Overhead	21.9	10.2	16.0	6.1
Machinery	11.4	5.3	21.6	9.4
Thrashing	17.3	8.0	17.2	7.4
Total other costs	50.6	23.5	54.8	22.9
Land charge	.....	54.0	.....	58.0
Value of land per acre	$180		$70	

TABLE 36.—*Clover seed: Labor and material requirements per acre.*

Region.	Number of records.	Yield per acre.	Man labor.		Horse labor.		Seed.	Per cent of operating expense covered by foregoing.[a]
			Harvest.	Total.	Harvest.	Total.		
		Bush.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Lbs.*	
Minnesota	8	.9	5.3	5.3	7.2	7.2	10.7	56
Wisconsin	17	1.6	8.9	8.9	7.0	7.0	10.3	40
Ohio	19	1.0	6.0	6.0	5.3	5.3	.....	53
Illinois	2	.7	8.5	8.5	11.9	11.9	6.6	55

[a] Excluding interest on land.

APPLES.

The apple acreage for which records are available is as follows: Wenatchee (Wash.), 566, Yakima (Wash.), 766; Hood River (Oreg.), 672; Payette (Idaho), 430; western Colorado, 1,351; western New York, 3,052—total, 6,837 acres. The records were obtained during the years 1914, 1915, and 1916.

The labor necessary for the production of apples varies considerably from year to year. The differences are due chiefly to size of crop and methods of soil management. Orchards may be handled by the clean-cultural method or by the sod or mulch crop method. In this study the more common method of soil management in each locality was considered. The man labor and horse labor requirements are based upon practice throughout a period of five or six years. The maintenance labor has been separated from harvest labor in order to indicate the relative demand for labor during these

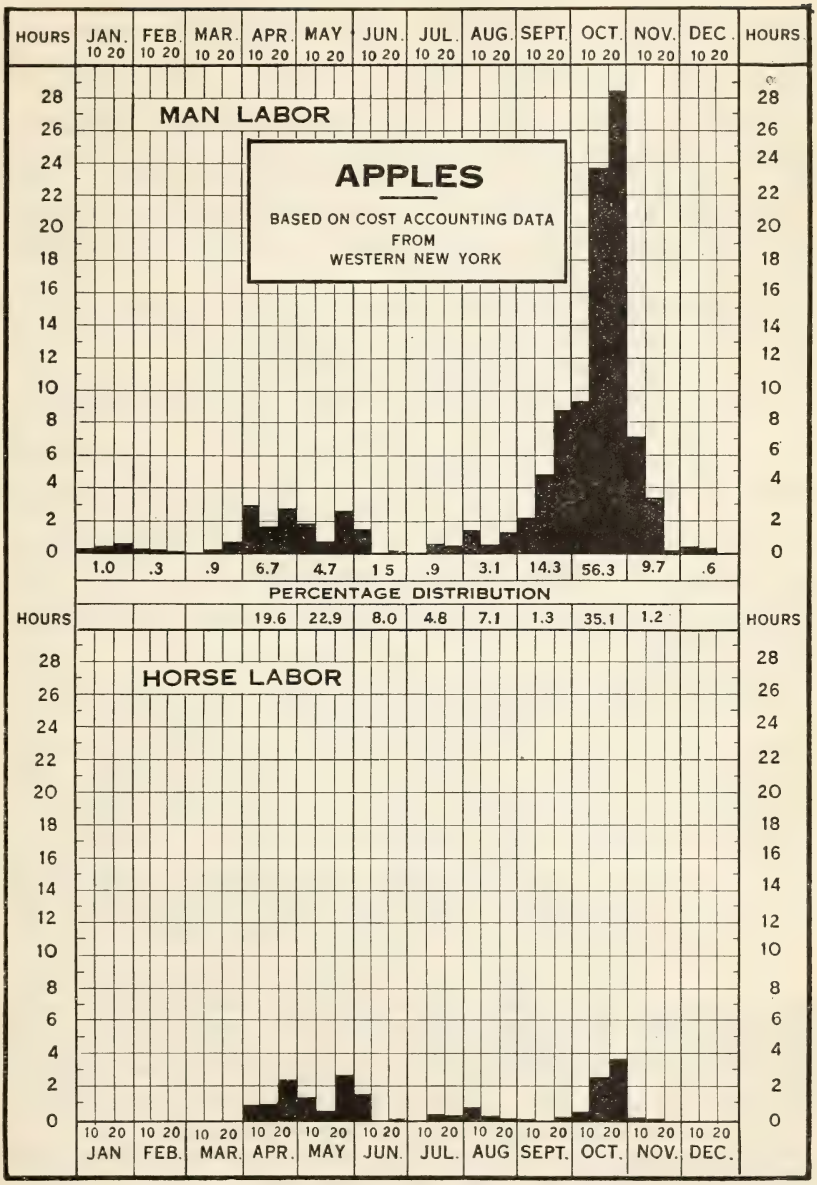
HOURS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
10 20
MAN LABOR
APPLES
BASED ON COST ACCOUNTING DATA FROM WESTERN NEW YORK
28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
1.0 .3 .9 6.7 4.7 1 5 .9 3.1 14.3 56.3 9.7 .6
PERCENTAGE DISTRIBUTION
19.6 22.9 8.0 4.8 7.1 1.3 35.1 1.2
HORSE LABOR
JAN FEB. MAR. APR. MAY JUN. JUL. AUG SEPT. OCT. NOV. DEC.

FIG. 14.—Distribution o fman labor and horse labor on 7 farms, with a total of 87 acres in bearing apples. Market labor and time spent on crops grown in these orchards have been excluded. Black bars indicate total hours spent per acre during 10-day periods.

two periods. The harvest labor is influenced largely by crop yields. It will be seen (Table 37) that the maintenance labor varied from 77 man hours per acre in western New York to 230 man hours per acre in Wenatchee Valley, Washington. Approximately the same range will be noted for the harvest labor. For most of these districts the harvest labor exceeded the maintenance labor quite appreciably.

Northwestern apple growers do not make a practice of using commercial fertilizers on their orchards, but in western New York about 50 per cent of the growers apply some commercial fertilizer. The average application of fertilizer was approximately 500 pounds per acre. The amount of farm manure applied annually to apple orchards as a whole was comparatively low.

For practically all of these districts the costs which are included under basic requirements constitute approximately 90 per cent of the total cost of producing apples, exclusive of land rent.

It will be seen that the gallons of solution used for the dormant spray are given in Table 37. Owing to variations in the solutions which were applied in subsequent sprays it did not appear to be feasible to separate the gallons of solution for each application, but the average number of sprays is given for each district, together with the average number of gallons of solution used with the later sprays. This method of reporting is not a satisfactory one, but the figures indicate in some measure the practices with respect to the use of spray materials.[1]

TABLE 37.—*Apples: Labor and material requirements per acre (642 records).*

Region.	Number of records.	Year.	Man labor.			Horse labor.			Manure.	Fertilizer.	Spraying.			Part of operating expense covered by foregoing.[a]	Yield per acre.[b]	Average land value per acre.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.			Dormant spray solution.	Other sprays.				
												Number.	Solution.			
			Hrs.	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Tons.*	*Lbs.*	*Gals.*		*Gals.*	*Per cent.*	*Boxes.*	
Wenatchee Valley, Wash.	87	1914	230	364	594	96	62	158	2.2	....	467	2.4	1,185	89	593	$1,925
Yakima Valley, Wash ..	120	1915	214	300	514	91	59	150	4.7	....	430	4.0	1,619	89	432	1,080
Hood River, Oreg.....	54	1915	142	164	306	82	33	115	1.5	....	222	4.8	1,040	82	222	991
Payette Valley, Idaho...	38	1915	177	235	412	72	41	113	4.0	...	389	3.1	1,155	93	337	613
Western Colorado.....	125	1914–15	161	191	352	76	47	123	3.5	....	353	4.0	2,020	89	284	653
															Bbls.	
Western New York.....	218	1915	77	93	170	63	27	90	4.8	177	264	2.3	620	91	[c] 84	514

[a] Per cent that man and horse labor, manure, fertilizer, spray materials and containers are of operating expense, exclusive of land rent.

[b] The average yield represents the yield over a five or six year period.

[c] To reduce to boxes, multiply by 3.

[1] See:

U. S. Dept. of Agr. Bul. 446. Cost of Producing Apples, Wenatchee Valley, Washington.

U. S. Dept. of Agr. Bul. 500. Cost of Producing Apples in Western Colorado.

U. S. Dept. of Agr. Bul. 518. Cost of Producing Apples in Hood River Valley, Oregon.

U. S. Dept. of Agr. Bul. 614. Cost of producing Apples in Yakima Valley, Washington.

U. S. Dept. of Agr. Bul. 636. Cost of Producing Apples in Payette Valley, Idaho.

U. S. Dept. of Agr. Bul. 851. Cost of Producing Apples in Western New York.

TABLE 38.—*Apples: Percentage distribution of costs per acre.*

Item.	Western New York.		Yakima Valley, Wash.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	34.8	28.1	50.2	37.9
Horse labor	12.6	10.2	8.5	6.4
Materials:				
Fertilizer and cover-crop seed	2.5	2.0	(a)	(a)
Manure	7.8	6.3	2.7	2.0
Gas and oil	.5	.4	.3	.2
Spray	8.0	6.5	4.6	3.5
Boxes and barrels	26.5	21.4	23.5	17.8
Total materials	45.3	36.6	31.1	23.5
Other costs:				
Apple building	1.9	1.5	1.6	1.2
Machinery	2.9	2.4	3.4	2.6
Taxes and insurance	2.5	2.0	4.4	3.4
Water rent	.....	.....	.8	.6
Total other costs	7.3	5.9	10.2	7.8
Land charge	.....	19.2	.....	24.4
Value of land per acre	$514		$1,080	

a Less than one-tenth of 1 per cent.

MISCELLANEOUS CROPS.

Besides the staple farm crops there are a great many minor crops. Although most of these may be the chief crops in certain sections, they are of secondary importance considering the country as a whole, and, therefore, have not been made the subject of special cost investigations. The only available data as to the cost of growing these crops have been obtained on farms where complete cost accounting records have been kept for the entire farm business. It will be observed in studying the following tables that in a number of instances the number of records is not sufficiently large to warrant drawing definite conclusions, but it is hoped that they may give a general idea as to the probable labor and material requirements for the crops in question.

Table 39 gives the cost for the miscellaneous crops that may be grown as regular field crops, while Table 40 gives the data for truck crops and the like. Each of the crops covered in Table 40 received about the same amount of care, namely, about 150 man hours per acre. The pansy and aster seed, though grown by experts and not of very much interest to the average farmer, are of general interest as examples of extremely intensive crops. An acre of pansy seed required as much man labor as is necessary to produce 200 acres of wheat in North Dakota. The crops listed in Table 40 are therefore types of crops that may be produced to advantage in sections where land is scarce and labor plentiful.

TABLE 39.—*Miscellaneous field crops: Labor and material requirements per acre.*

Region and crop.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Twine.	Manure.	Fertilizer.	Per cent of operating expense *a* covered by foregoing.
			Prior to harvest.	Harvest.	Total.	Prior to harvest.	Harvest.	Total.					
New York:		*Bush.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bush.*	*Lbs.*	*Tons.*	*Lbs.*	
Buckwheat		19.3	11.0	6.7	17.7	27.6	5.6	33.2	1.0				73
		Lbs.											
Peas (canning)	5	1,112.6	19.6	20.8	40.4	37.9	17.0	54.9	4.0			251.8	89
Pennsylvania:		*Bush.*											
Buckwheat		19.5	13.8	4.8	18.6	28.5	6.2	34.7	1.0				74
Minnesota:													
Flax	8	7.5	6.1	4.0	10.1	21.7	7.5	29.2	.5	4.0			72
North Dakota:													
Flax	25	7.5	3.3	2.3	5.6	15.2	4.3	19.5	.5	1.8			60
Wisconsin:													
Buckwheat	3	16.8	6.0	10.6	16.6	17.0	8.0	25.0	.8	2.0			80
		Tons.											
Cabbage	5	10.7	37.6	64.0	101.6	30.8	54.8	85.6	[b]5,500		3.0		90
		Bush.											
Peas (dry)	8	12.4	7.8	10.8	18.6	19.2	8.8	28.0	2.1				75
									Lbs.				
Onions	4	329.0	323.6	126.4	450.0	32.5	24.0	56.5	5.2		10.0		88

[a] Excluding interest on land. [b] Plants.

TABLE 40.—*Miscellaneous crops (truck, etc.): Labor and material requirements per acre.*

Region and crop.	Number of records.	Yield per acre.	Man labor.			Horse labor.			Seed.	Fertilizer.
			Prior to harvest	Harvest.	Total.	Prior to harvest	Harvest.	Total.		
Wisconsin:		*Bushs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Hrs.*	*Bushs.*	*Lbs.*
Onions (seed)	3	260.0	106.8	55.2	162.0	58.0	0.3	58.3	28	
									Lbs.	
Beets	4	69.0	68.0	73.0	141.0	53.0	28.0	81.0	8.2	
Mangels	1	385.0	101.8	38.1	139.9	36.7	21.5	58.2	5.8	
Turnips	1	333.0	91.6	41.7	133.3	40.8	43.3	84.1	3.0	
		Lbs.								
Radish seed	1	35.0	67.8	55.4	123.2	61.6	8.9	70.5	3.1	
Cucumber	1	215.0	66.0	64.8	130.8	83.8	5.7	89.5	3.6	
Pansy seed	1	9.4	566.8	321.1	887.9	24.7		24.7	.7	
Aster seed	2	39.0	230.0	95.0	325.0	193.5	1.5	195.0	.6	
Pennsylvania:										
Tomatoes	1				170.4			48.7		
New Jersey:									*Oz.*	
Tomatoes					125.9			85.0	24	84.4

TABLE 41.—*Flax: Percentage distribution of costs per acre.*

Items.	North Dakota.		Minnesota.	
	Distribution of operating expense.	Distribution of total costs.	Distribution of operating expense.	Distribution of total costs.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Man labor	22.4	16.9	19.0	13.9
Horse labor	24.1	18.1	32.4	23.8
Materials:				
Seed	10.1	7.6	14.3	10.5
Twine	3.3	2.5	7.2	5.3
Total materials	13.4	10.1	21.5	15.8
Other costs:				
Overhead	7.6	5.7	10.3	7.6
Machinery	8.9	6.7	7.9	5.8
Thrashing	23.6	17.8	8.9	6.6
Total other costs	40.1	30.2	27.1	20.0
Land charge		24.7		26.5
Value of land per acre	$33		$70	

METHOD OF USING FOREGOING DATA IN ESTIMATING COSTS.

The figures presented in the foregoing tables represent the average crop requirements for the regions investigated, and may be of value to those interested in determining general costs, and to individual farmers as a basis for determining approximate costs on their own farms. In either case the method of procedure is the same, the only difference being that average rates should be used for finding regional costs, while the individual farmer should use, if available, the actual hours of labor and rates for labor and materials applicable to his own farm.

It will be understood that the requirements and proportions presented for each crop may be used in approximating costs in those areas only in which the farm practice in general is similar to that of the regions for which the data are given.

The method of estimating the cost of a given crop may be outlined as follows:

1. **Determine the total cost of labor and material per acre** *by applying current rates to the quantities of labor and materials obtained from the individual's own records, or, if these are not available, use the averages given in the table.*

2. **Determine the total operating expense per acre** *by dividing the cost of labor and material by the percentage figure (per cent of total operating expense) for the given crop in the given region.*

3. **Determine the total acre cost of production** *by adding the interest charge or the cash rent paid for the use of land.*

4. **To determine the cost per bushel or ton** *divide the total acre cost by the yield per acre.*

The following examples will illustrate the way in which these rules are applied.

EXAMPLE 1.—*Showing how to use the figures presented for estimating the cost of silage on a farm in Iowa.*

[See Table 3.]

Item.	Amount.	Estimated rate.	Cost.
Man labor.....hours..	27.9	$0.35	$9.76
Horse labor.....hours..	51.8	.25	12.95
Seed.....lbs..	9.9	.08	.79
Manure.....tons..	2.2	2.00	4.40
Gasoline.....gals..	2.8	.25	.70
Coal.....lbs..	14.0	.005	.07
Twine.....lbs..	3.6	.25	.90
Total labor and material (80 per cent of operating expense)			$29.57
Total operating expense (100 per cent) [a]			36.96
Interest on acre of land ($200 at 5 per cent)			10.00
Total cost			46.96
Average yield per acre, tons			9.8
Average cost per ton			$4.80

[a] $29.57 ÷ 80 × 100 = $36.96, or total operating expense.

NOTE.—The following figures show how to make the necessary adjustments for a farm where, for example, $5 worth of fertilizer was applied to the corn land, but on which no twine was used: $46.96+$5.00=$51.96, less twine ($0.90)=$51.06.

EXAMPLE 2.—*Cost of producing clover hay in New York, 1921.*

[See Table 30.]

Item.	Amount.	Estimated rate.	Cost.
Man labor.....hours..	8.9	$0.30	$2.67
Horse labor.....hours..	9.9	.20	1.98
Seed.....pounds..	10.1	[a].53	2.67
Total cost of labor and material (80 per cent of operating expense)			$7.32
Total operating expense (100 per cent) [b]			9.15
Interest on land ($84 at 5 per cent) [c]			4.20
Total cost of producing 1 acre			13.35
Average yield per acre.....tons..			1.96
Average cost per ton			$6.80

[a] If seed is estimated at $32 per bushel the total cost of seed per acre is $5.35, which must be prorated over the number of years that the land is expected to remain in hay. In this illustration it was assumed that the field would be left two years ($5.35÷2=$2.67). It was also assumed that the seed was sown with a nurse crop, so there was no labor nor machine charge for sowing. On farms where the sowing of the grass seed is a separate operation, the cost of such labor must be added to the cost of the seed. Thus, 1 man hour and 2 horse hours for sowing would make a cost of 65 cents per acre, to which may be added 15 cents for the seeder, thus giving a grand total of 80 cents for sowing. This, added to the cost of seed, would increase the seed charge from $5.35 to $6.15 per acre ($6.15÷2=$3.07 per year).

[b] $7.32÷80×100=$9.15, or total operating expense.

[c] See Table 42 on present land values.

EXAMPLE 3.—*Cost of producing potatoes, Barron County, Wis., 1920.*

[See Table 8.]

Item.	Amount per acre.	Estimated rate.	Cost per acre.
Man labor.....hours..	92.7	$0.40	$37.08
Horse labor.....hours..	100.3	.20	20.06
Manure.....tons..	7.1	2.00	14.20
Seed.....bushels..	11.6	3.75	43.50
80.6 per cent of operating expense			$114.84
Total operating expense			142.48
Interest on land (6 per cent on $179)			10.74
Total cost per acre			153.22
Total cost per bushel (90 bushels)			1.70

NOTE.—In this example 1920 rates and values were applied to the basic quantity requirements found in the 1919 study for the Barron County area. The man labor rate increased approximately 20 per cent and cost of seed potatoes 300 per cent over 1919. The high price of seed accounts for the high cost per bushel of yield. Figuring labor, fertilizer, and seed together at prevailing rates for any year, the result will be approximately 80 per cent of the total operating expense per acre (not including land rent). This percentage will fluctuate slightly from year to year, as the rates for one or more of these factors increase or decrease more rapidly than the others. It may, however, be taken as a fair approximation. A few farmers in Barron County applied commercial fertilizer to the potato crop. When this charge was prorated to all farms, it amounted to a cost of 14 cents per acre. This amount has not been added in preparing the potato example. On farms where fertilizer is applied this item should be included in computing the operating expense per acre.

EXAMPLE 4.—*Cost of producing wheat, McPherson County, Kansas, 1920.*

[See Table 19.]

Item.	Amount per acre.	Estimated rates.	Cost per acre.
Man labor (prior to harvest)....hours..	4.5	$0.30	$1.35
Man labor (harvest)....do....	4.8	.60	2.88
Horse labor....do....	26.9	.20	5.38
Seed....bushels..	1.1	2.50	2.75
Manure [a]....tons..	.5	2.00	1.00
Twine....pounds..	2.7	.25	.68
63 per cent of operating expense			$14.04
Total operating expense			22.29
Interest on land (6 per cent on $134)			8.04
Total cost per acre			30.33
Total cost per bushel (15.4 bushels)			1.97

[a] Comparatively few farmers applied manure to the wheat land in McPherson County. When the manure was prorated to all the farms in this group, the application amounted to one-half a ton per acre and the charge made a total of $1 per acre. The cost of manure on this basis was approximately 5 per cent of the operating expense.

EXAMPLE 5.—*Showing application of 1920 rates to basic factors in estimating the operating expenses per acre and per pound for cotton (without land rent), Mitchell County, Georgia.*

Item.	Amount.	Approximate rates.	Per acre.	Per cent operating costs.
Man labor....hours..	100	$0.30	$30.00	53.8
Mule labor....do....	48	.20	9.60	17.2
Seed....bushels..	1	[b] 81.00	1.21	2.2
Fertilizer....pounds..	277	[b] 45.00	6.23	11.2
Subtotal			47.04	84.4
If $47.04=84.4 per cent of total cost, then the total [a] cost (100 per cent) equals			55.73	
Seed credit....pounds..	300	[b] 26.00	3.90	
Total net cost per acre			51.83	
Interest on land (6 per cent on $67)				$4.02
Total net cost per acre				55.85
Total net cost per pound of lint ($55.85÷159)				.35

[a] Including in addition manure, equipment, taxes, insurance, ginning, and overhead.
[b] Per ton.

VALUE OF PLOW LANDS.

In view of the fact that it has been customary in some methods of accounting to include interest on land as a cost, a table showing the value of plow lands in the United States has been added for convenience. To compute the approximate land charge for a particular district, ascertain the usual interest rate for this region, then multiply this rate by a valuation which appears to be fair for the kind of land devoted to the crop under consideration. It is assumed that Table 41 will afford some suggestions concerning the values for different grades of land.

TABLE 42.—*Value of plow lands.*[a]

State.	Average of poor plow lands.			Average of good plow lands.			Average of all plow lands.			
	1921	1920	1919	1921	1920	1919	1921	1920	1919	1918
Maine	$25.00	$30.00	$24.00	$50.00	$56.00	$50.00	$36.00	$42.00	$37.00	$35.00
New Hampshire	24.00	24.00	23.00	63.00	64.00	54.00	41.00	42.00	39.00	39.00
Vermont	29.00	30.00	30.00	67.00	69.00	64.00	47.00	48.00	44.00	44.00
Massachusetts	40.00	40.00	41.00	98.00	103.00	92.00	69.00	72.00	68.00	68.00
Rhode Island	50.00	50.00	47.00	105.00	105.00	92.00	85.00	85.00	73.00	70.00
Connecticut	34.00	35.00	37.00	90.00	100.00	80.00	58.00	60.00	55.00	52.00
New York	40.00	39.00	38.00	84.00	84.00	80.00	65.00	64.00	60.00	58.00
New Jersey	55.00	50.00	50.00	125.00	104.00	103.00	92.00	80.00	76.00	78.00
Pennsylvania	39.00	40.00	38.00	81.00	86.00	79.00	62.00	66.00	60.00	58.00
Delaware	38.00	44.00	36.00	72.00	86.00	70.00	55.00	66.00	55.00	59.00
Maryland	31.00	46.00	39.00	70.00	82.00	66.00	51.00	60.00	53.00	47.00
Virginia	32.00	34.00	31.00	70.00	73.00	62.00	50.00	53.00	47.00	43.00
West Virginia	31.00	32.00	29.00	70.00	75.00	64.00	48.00	51.00	44.00	43.00
North Carolina	36.00	42.00	31.00	76.00	87.00	67.00	55.00	63.00	50.00	42.00
South Carolina	32.00	41.00	27.00	68.00	82.00	56.00	50.00	61.00	45.00	36.00
Georgia	23.00	30.00	24.50	50.00	63.00	49.30	36.00	46.00	37.50	28.00
Florida	25.00	23.00	21.00	55.00	53.00	48.00	40.00	36.00	33.00	32.00
Ohio	60.00	69.00	63.00	110.00	132.00	113.00	88.00	105.00	91.00	86.00
Indiana	71.00	80.00	68.00	137.00	150.00	126.00	109.00	119.00	100.00	96.50
Illinois	105.00	115.00	100.00	196.00	213.00	170.00	157.00	170.00	144.00	132.00
Michigan	41.00	41.00	40.00	83.00	80.00	76.00	65.00	64.00	61.00	60.00
Wisconsin	65.00	66.00	60.00	122.00	125.00	110.00	98.00	100.00	89.00	82.00
Minnesota	74.00	73.00	59.00	121.00	120.00	88.00	101.00	100.00	78.00	75.00
Iowa	145.00	157.00	129.00	238.00	257.00	196.00	200.00	219.00	169.00	154.00
Missouri	58.00	60.00	51.00	106.00	110.00	91.00	83.00	87.00	72.00	66.00
North Dakota	30.00	31.00	27.50	49.00	49.00	43.00	42.00	43.00	37.00	35.00
South Dakota	66.00	67.00	50.00	102.00	108.00	77.00	85.00	90.00	67.00	56.00
Nebraska	80.00	85.00	67.00	140.00	150.00	115.00	115.00	125.00	95.00	80.00
Kansas	50.00	50.00	44.00	90.00	90.00	77.00	70.00	70.00	61.00	58.00
Kentucky	33.00	42.00	37.00	75.00	95.00	80.00	53.00	70.00	61.00	50.00
Tennessee	35.00	40.00	31.00	81.00	90.00	75.00	55.00	60.00	53.00	48.00
Alabama	17.00	20.00	17.00	38.00	43.00	33.00	26.00	30.00	24.00	21.00
Mississippi	16.00	23.00	16.00	36.00	49.00	33.50	26.00	35.00	25.50	23.00
Louisiana	24.00	34.00	25.00	50.00	65.00	44.00	38.00	50.00	33.00	33.00
Texas	33.00	36.00	27.00	70.00	72.00	58.00	52.00	56.00	46.00	45.00
Oklahoma	29.00	30.00	24.00	63.00	63.00	51.00	46.00	47.00	38.00	35.00
Arkansas	24.00	26.00	22.00	54.00	65.00	50.00	38.00	45.00	38.00	31.00
Montana	19.00	21.00	21.00	41.00	48.00	45.00	30.00	36.00	34.00	35.00
Wyoming	25.00	34.00	26.00	60.00	70.00	53.00	44.00	53.00	43.00	41.00
Colorado	35.00	40.00	36.00	86.00	88.00	80.00	67.00	66.00	60.00	55.00
New Mexico	30.00	30.00	30.00	60.00	60.00	60.00	45.00	45.00	45.00	42.00
Arizona	75.00	90.00	60.00	140.00	180.00	125.00	120.00	130.00	100.00	98.00
Utah	50.00	60.00	55.00	140.00	135.00	125.00	100.00	103.00	95.00	86.00
Nevada	45.00	46.00	50.00	90.00	110.00	110.00	75.00	80.00	85.00	80.00
Idaho	58.00	60.00	50.00	128.00	135.00	98.00	99.00	105.00	76.00	70.00
Washington	63.00	68.00	60.00	140.00	150.00	121.00	105.00	115.00	95.00	94.00
Oregon	60.00	60.00	53.00	135.00	130.00	108.00	103.00	100.00	81.00	84.00
California	75.00	70.00	69.00	200.00	175.00	165.00	135.00	130.00	121.00	120.00
United States	56.66	60.76	51.26	106.33	113.34	91.83	83.78	90.01	74.31	68.38

[a] From Monthly Crop Reporter, March, 1921.

LABOR DISTRIBUTION AMONG FARM ENTERPRISES.

Figures 15 and 16, showing the distribution of man labor on two representative farms, illustrate the manner in which the various enterprises of the farm compete for labor at different periods throughout the year. It should be noted, that the length of each bar represents the average hours per day of the ten-day period and not the total hours, as in the case of the foregoing single enterprise charts.

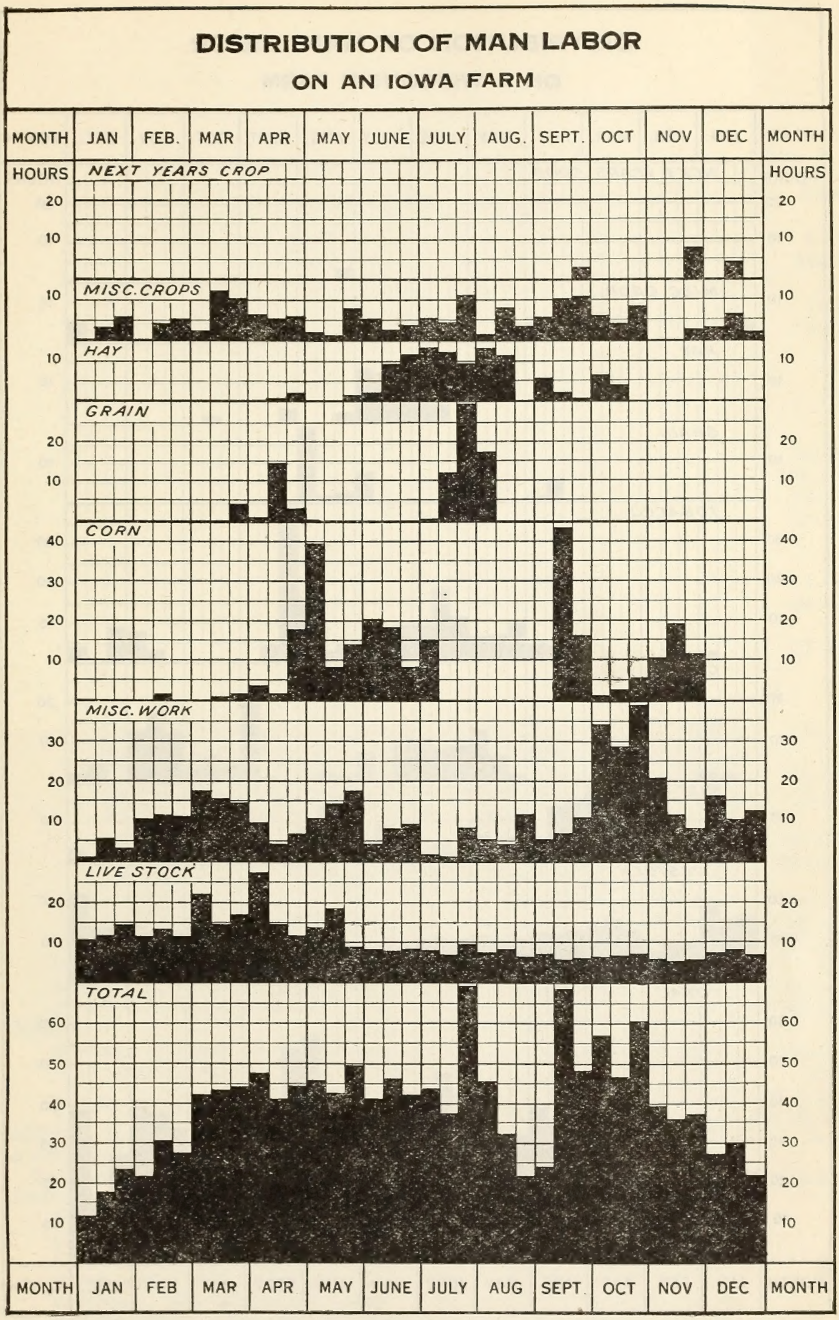

FIG. 15.—Distribution o man labor on an Iowa farm. This farm had the following crop and live stock organization: Silage corn, 26.4 acres; ear corn, 69 acres; corn hogged down, 5.75 acres; oats, 26.1 acres; barley, 15.88 acres; spring wheat, 4.7 acres; winter wheat, 17 acres; clover, 13.2 acres: timothy hay, 19.3 acres; timothy seed, 17.5 acres; alfalfa, 9.3 acres; potatoes, 3.5 acres. Total crop acreage, 227.63. The following live stock was kept on the arm: Horses, 14.1; cows, 6; steers, 24.2; beef cattle (breeding herd), 28.1; hogs, 16.1; making a total of 88.5 animal units. Black bars indicate average hours per day for each 10-day period.

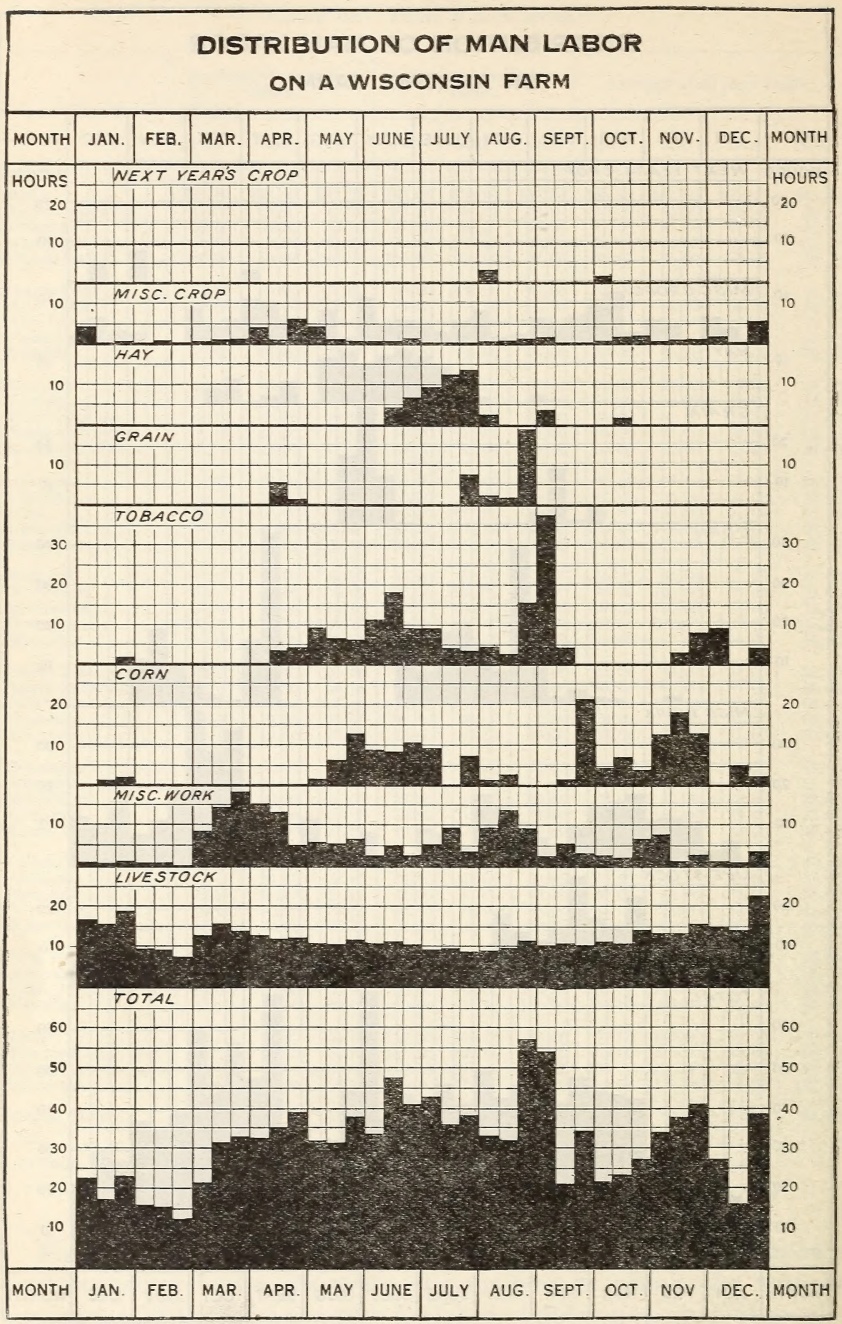

FIG. 16.—Distribution of man labor on a Wisconsin farm. On this farm the following crops were grown: Silage corn, 10 acres; husked corn, 39.8 acres; tobacco, 10.6 acres; barley, 12.5 acres; oats, 39.6 acres; clover hay, 26.8 acres; alfalfa, 3.4 acres; potatoes, 1 acre. Total crop acres, 143.7. The live stock organization was as follows: Horses, 5; dairy cows, 19; hogs, 0.8. Total, 25 animal units. Black bars indicate average hours per day for each 10-day period.